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J. J. Roberts

PRESIDENT.

December, 1922

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A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

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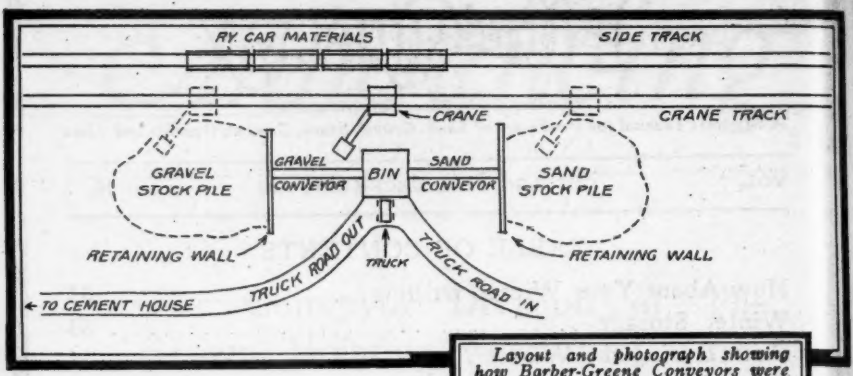
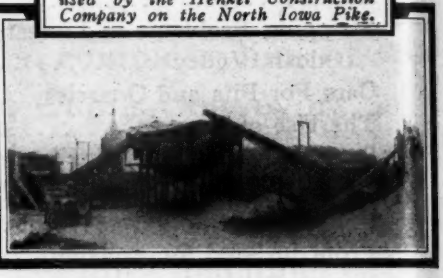


Layout and photograph showing how Barber-Greene Conveyors were used by the Henkel Construction Company on the North Iowa Pike.



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On a section of the North Iowa Pike, between Hutchins and the Kossuth County Line, the Henkel Construction Company of Mason City had an average sand and gravel haul of two and a half miles to the mixer. Fifteen trucks were operated.

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The two Barber-Greene Conveyors were used to reclaim from the stock piles. Each one was served by one operator and two helpers.

Other contractors also use Barber-Greene Conveyors in place of cranes for unloading from cars.

On the Rome-Morgan road in Ohio last year, E. J. Inman of Ashtabula found that a ¾-ton yard crane could unload a maximum of only six cars a day into bins. Its daily average was only four cars.

At the time it didn't seem likely to him that equipment costing much less to buy and operate could do twice as much.

It was demonstrated, however, that a Barber-Greene Portable Conveyor on the same job could unload as many as twelve cars into bins, and average ten.

This year he has found that he can do without the bins.

He unloads a five-ton truck directly from the car in one and a half minutes. Without making a new set-up he pivots the Barber-Greene to unload on two stock piles.

By changing the set-up he reclaims from the stock pile with the Barber-Greene.

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Pit and Quarry

Vol. 7 Chicago, Ill., December, 1922 No. 3

How About Your Winter Drilling?

IT is during the winter season that it is sometimes possible in big quarry operations to provide for handling more blasted rock during the summer season by doing a considerable amount of drilling for large blasts. This is especially true if large blast hole drills are used. The progress of such a drill through ledge rock is comparatively slow. For this reason blasting is sometimes held up and the quarry worked to a disadvantage, waiting for deep holes to be drilled.

To realize how slow this kind of drilling may be, the writer has before him eight examples of drilling with large blast hole drills in different kinds of rock in various sections of the country. A record is given of the kinds of rock and the average footage drilled per hour.

No.	Feet
1. Limestone	5.2
2. Dolomite	5
3. Limestone	9
4. Cement Rock	6.5
5. Limestone	11
6. Trap Rock	1
7. Shale	10
8. Earth, shale, sand stone	12.2

Thus in an eight hour day from 8 feet to 100 feet were averaged. This does not include the changing from one hole to another and the time used in setting up the machine.

It can thus be seen that with ledges varying from 50 to 150 feet in height and the holes spaced from 10 to 25 feet apart, that weeks and months can be spent by one machine in drilling enough blast holes to throw down a large tonnage.

Thus if the drilling for several months of the regular season can be done during the winter it is a decided advantage.

At times and in some sections of the country the drilling may be done at less cost than during the summer. If there is some overburden on the rock it may be frozen so hard that it will not interfere with the operation of the drill, nor will a short piece of casing have to be used, to prevent the soil from ravelling and dropping down into the hole.

With the ground and ledge saturated with water in some sections of the country during the winter, water will collect in the hole so that the drill will operate easier. The other quarry operations will not interfere with the drilling.

With a longer drilling season not so many drills will have to be used in the quarry.

After the holes are drilled large wooden plugs can be driven into them and allowed to remain until it is desired to make a blast. Then the plugs can be removed and the holes cleaned out.

Winter Storage

DURING the past year there has appeared in this magazine, at the request of readers, several articles on extensive and permanent storage systems for sand, gravel, and crushed stone.

The need of such systems has been pointed out, but in many cases they are too expensive for some operations. There are also cases where plants do not need permanent storage, but only

temporary storage. This temporary storage is frequently needed during the winter months, when it is possible to carry on the plant operations but there is no immediate sale.

It is not practical to spend too much money for plant to store the materials. The actual equipment needed can be made small, depending upon the location of the plant, the highest point reached by the material and location of the available storage ground.

If the material is raised to a high elevation it may be possible to place it in storage piles by means of gravity and the use of chutes.

If this cannot be done, then it is possible to use portable conveyors to handle the stone, or semi-portable conveyor or belt, that can be located with one end under the bins, and by swinging that in a circle not only one storage pile can be made, but several of different kinds of material.

Material can be handled from one conveyor to another and thus either carried a greater distance or piled higher. For cheap storage, ground storage is always the answer.

To rehandle these stored materials either the same conveyors can be used or one of the many types of wagon loader. Also grab buckets with derricks can be used and likewise steam shovels. The entire question must be answered by what equipment the operator may already own that is suited to the work.

Even when winter is over it may be a good business proposition to use ground storage. By it the plant may be able to work to capacity, and the thousands of dollars invested in it made to pay better dividends. Large bins are expensive. With both bins and ground storage, there will be no lost time by trucks. Nor will the crushers have to stop for either a lack of cars or trucks, nor will the trucks have to wait while material is being produced.

The advantages of this ground storage is to permit the plant and the haulage equipment to operate independently; also a longer seasonal production, a smaller investment in haulage equipment, and the reduction of overhead charges. All of these things means a more profitable operation.

Paint During the Winter

MANY pit and quarry operators will soon be shutting down their plants for the three or four severe winter months, a period of enforced idleness that means in some cases the saving of much money over endeavoring to operate under adverse weather conditions.

During these months many repairs will be made, and additions to plants built, as well as alterations that will mean cheaper operation with increased production. These will be wise measures; but there is one item that many operators overlook or forget.

That is painting. It is true that pit and quarry plants are not built for appearance, but for use, but there can be no possible objection to making a building or structure better looking by painting it. The painting of buildings certainly gives prestige to a plant and will add to the feeling that both employer and employee will have the *esprit de corps* of their organization. It will likewise attract attention from the public and will prove an asset in many ways.

It has been said that annual painting of structures pays dividends all out of proportion to the cost. This has been demonstrated by steamship owners who find that both wood and metal are preserved by paint. The harder the usage of machines and structures, the more it pays to paint. Water, steam, heat, cold, dust and dirt are sure decayers of both wood and metal.

The progress of oxidation or decay may be slow, but it is going on all the time and paints of different kinds are the only preservatives. It is true that some preservatives of wood are applied under pressure, but the surface is likewise treated so even these may be included with paints.

Today there are on the market paints of many kinds, each meant for a different and distinct purpose. The ordinary user of paint does not have sufficient knowledge of such things and is apt to use the same paint on both wood and metal, on cold surfaces or hot ones.

If surfaces are to be continually wet, especially timbers, then a damp-proofing paint or wood preservative should be used. Other wooden surfaces should be painted with a high grade house paint. Iron and steel should have some metal paint or carbonizing coating put on them. Metal that is to be heated should have a hot paint. Those exposed to gases and acids should have a special paint for that purpose.

One material used extensively around pit and quarry plants is galvanized iron. It is extremely important that this metal be kept painted. From the instant it is exposed to the weather these sheets begin to rust, due to the almost microscopic pin holes in the galvanized surface, so that paint must be applied to prevent this deterioration. Few paints will adhere for any length of time to this metal, so it is necessary to use a special paint made for galvanized surfaces.

The same thing is true about concrete surfaces. Concrete structures should be painted to protect them, and for some there must be a special damp proof paint. Paint for other materials does not adhere well to concrete. Floors made of concrete should likewise be painted and treated with hardening compounds, so as to prevent them from dusting and to prevent cracks occurring.

Even such things as locomotives, cars, steam shovels, and other machines used away from the plant should be painted to protect them.

Experts

EXPERTS, especially in efficiency for pits and quarries, pay for themselves as the result of their work. Thus they are never a direct expense. They effect such savings and economies that they net the operator additional profits and from such profits they are paid. And after the employment of the expert ceases, the added profits continue.

In advising operators, the expert may, by preventing one mistake, be the means of saving thousands of dollars in either capital invested or through operation. The expert has the advantage over the operator of seeing many plants and gaining experience from the mistakes of others, while the operator has only the experience gained at his own plant or plants, and he becomes accustomed to the shortcomings of his own operations, not realizing he may be wasting money.

Experts are essential in almost any industry today, for improvements are many, machinery is becoming essential and complex, and a busy operator can hardly be expected to keep posted in all matters.

PIT AND QUARRY cannot send experts to advise its readers, individually, but each issue of the paper contains much expert advice concerning many problems of installation and operation, and does give answers to any questions or problems that are sent to the editors.

To all of its readers a hearty invitation is extended to send in letters on any subject upon which information is desired.

Stripping Problems in Limestone Quarries of Shenandoah Valley

By OLIVER BOWLES
Mineral Technologist, U. S. Bureau of Mines.

THE United States Bureau of Mines has recently undertaken a study of limestone quarrying for lime manufacture, in connection with which a series of short papers on various phases of the industry will be issued. The present report is the first of this series.

The purpose of these reports is to discuss conditions, methods, and equipment, in order to promote high efficiency and safety in the operation of the quarries. It is highly desirable that quarry operators and superintendents study these reports carefully, and supply the Bureau of Mines with any criticisms or suggestions that may assist in a proper solution of the problem. The bureau's representative has observed many quarries in widely separated localities, but undoubtedly a more comprehensive and helpful final report can be prepared if his observations are supplemented by suggestions from practical men who are actively employed in quarry work. It is urgently requested therefore that any reader of this report who has had experience in quarrying will write to the bureau giving suggestions.

The limestones of the Shenandoah Valley of Virginia and West Virginia are characterized by numerous solution cavities brought about by surface or subterranean stream erosion. Some form extensive caverns in which part of the dissolved calcium carbonate (limestone) has been redeposited as stalactites and various other ornate forms. Some of the caverns have been illuminated and opened to the public as commercial enterprises. In a few instances the cavities constitute a commercial asset in the Valley, yet from the quarryman's point of view they are a decided disadvantage, for they constitute one of his hardest problems.

The quarryman's difficulty is due to the occurrence, even at considerable depth, of erosion cavities, not in the form of open spaces, but filled with red clay. These clay masses are troublesome, and their removal is costly. The problem is of general interest to all limestone quarrymen, for erosion cavities are characteristic of limestone deposits though they are not generally developed as much as in the district under consideration. In many quarries throughout the Valley the stripped rock surface is very rugged, consisting of knobs or spires of rock with irregular cavities or cracks between them. Solution has not only honeycombed the surface, but it has followed joints or other planes of weakness, and thus has dissolved out seams or pockets many feet in depth. Masses of clay 30 to 60 feet in width have been observed 80 feet below the rock.

In general the clay pockets are very numerous at the surface, and are absent or greatly reduced in size at depths of 10 to 20 feet. Thus the bulk of the clay is usually found in the upper 6 to 12 feet of the rock mass; in many quarries this upper zone contains as much clay as rock, or the clay content may exceed that of rock.

Clay is a hydrous silicate of aluminum, hence if clay is burned with the limestone, a lime contaminated with alumina and silica results. For certain uses a limited percentage of such impurities is permissible, but for most purposes a high degree of purity is demanded. It is apparent therefore that a clean separation is required, and owing to the large proportion and irregu-

lar occurrence of the clay such separation is surrounded by many difficulties.

Two general methods are followed in removing the clay. The greater part of it may be stripped back before the ledge is blasted down, or clay and rock may be shot down together and separated later at the quarry floor. The first method is usually followed where a foot or more of solid clay lies above the highest points of rock. Where numerous knobs or ridges of rock are exposed at the surface, the difficulty of digging the clay from between the rock masses commonly results in the quarryman's following the second method—that of blasting down rock and clay together, and separating them while loading.

Where a large volume of clay occurs free enough from rock masses to permit the use of such mechanical equipment as the steam shovel or dragline scraper, it is undoubtedly wiser to remove as much as possible of the clay before blasting down the rock. If the rock surface is so extremely rugged that it is advisable to use hand tools only, the relative merits of the two methods are more difficult to judge. If rock and clay are shot down together, the intimate mixture makes separation slow and difficult. In rainy weather the clay adheres to the rock fragments, and the quarrying of clean rock becomes impossible. On the other hand, in cleaning out the pockets before blasting, the clay is fairly free of loose rock fragments, and the rock subsequently shot down is clean in either wet or dry weather. In loading dirt at the quarry floor, however, the laborer is required to lift it only high enough to clear the edge of the quarry car; in cleaning out pockets from the surface, clay must sometimes be raised 10 to 20 feet. Loading in the quarry is also much more rapid as the clay is loose, whereas the firm, undisturbed clay in the pockets may require excessive use of the pick, or may even require blasting; thus its removal is slow and expensive.

Hand loading of clay is laborious, slow, and costly. This fact is recognized by most quarry operators, but owing to the peculiar conditions in the Shenandoah Valley, the method is still widely used. The cost of loading dirt at the quarry floor in 1922 varies from 15 to 25 cents per cubic yard. Hand loading of clay at the surface varies from 30 to 45 cents a yard. The latter figure applies to direct loading of clay from the bank to the car or dump cart. The cost may be very much higher where the clay is removed from deep cavities. At one quarry observed four men shovelled the same masses of clay to successively higher benches, and the fifth man loaded it into a dump cart. Under such conditions the cost might reach $1 or $1.50 per yard. Owing to the excessive cost of hand loading, and its wide employment in the Valley, the Bureau of Mines, though recognizing the difficulties to be overcome, urged upon operators the desirability of seeking more efficient methods. Improved methods now employed or proposed are discussed in the following paragraphs.

Hydraulicking is one of the most efficient methods yet devised for the removal of overburden. Water is pumped at high pressure, and is directed against the bank through a special nozzle. The method, however, is limited in application, as certain specific conditions must be met. First, there must be an adequate water supply. Second, the quarry must have proper drainage. The most favorable condition is where the natural drainage is back from the face so that the soil may be washed away in some ravine, or other depression, where no further handling is required. In exceptional cases the soil may be carried toward the quarry face. In a quarry near St. Louis, Mo., hydraulic stripping has been successfully em-

ployed where the soil is carried across the quarry to the river by aqueduct. At a cement plant in Virginia the clay is washed to the quarry floor where it is later loaded by steam shovel and removed in cars. It is unlikely that the hydraulic method can be employed profitably except in shelf quarries where automatic drainage carries off the water used in stripping. A third condition to be met is the availability of a suitable settling basin where the soil may be disposed without covering adjacent property or contaminating streams on which other industries depend.

The hydraulic method has been used with success in the Shenandoah Valley, the cost of soil removal being not more than 12½ cents per cubic yard. The bureau has a record of a hydraulic stripping cost at a marble quarry in Tennessee, in 1916, of only 2 cents per cubic yard. In the gold districts of California where some years ago hydraulic mining was widely used the cost of handling gravel was about 2½ cents per cubic yard. As the actual gold value in much of the gravel did not exceed 3 to 5 cents per cubic yard the cost of hydraulicking must have been kept considerably below these figures. At one of the large iron mines in Minnesota very extensive hydraulic stripping was conducted about 1914 at an average cost of 6.7 cents per cubic yard including upkeep and office expense. In the Florida phosphate fields hydraulic stripping of fine overburden cost 5 to 8 cents per cubic yard in 1912. In the Tennessee brown phosphate fields hydraulic stripping some years ago cost about 7 cents per cubic yard. At a Missouri cement plant quarry visited by the writer in 1916 hydraulic stripping cost including blasting of hard soil, was about 7 cent per cubic yard. Under 1922 operating costs these figures should be increased approximately 50 per cent.

A drag-line excavator operated from a derrick arm has been used successfully in cleaning out clay pockets in Pennsylvania. The entire equipment is on a portable mounting, and the excavated material is loaded on cars just as when a steam shovel is employed. It cleans out shallow depressions fairly well, but some hand work is required in the deeper cavities. The lateral motion of the derrick arm gives the excavator a wide range and great flexibility of movement.

The simple form of drag-line scraper may be used where a convenient dumping ground is available. Though some convenient devices for shifting the sheave attachment have been devised, in general this scraper lacks flexibility in lateral motion. Its use at limestone quarries has not yet been observed by the writer.

A clam-shell bucket operated from a derrick arm or crane has been used to a limited extent in moving soil overburden. Its usefulness in removing clay from erosion cavities is not yet established, and further information is desirable.

A small tractor excavator widely used in road grading has been employed with success on eroded limestone surfaces in Pennsylvania. The dipper slides back and forth on an arm 12 or 14 feet in length, which may be raised and swung aside for dumping into cars or wagons. The excavator is so equipped that the dipper may be lowered into a pit, loading as it is elevated toward the surface. Such an adaptation permits it to be used in cleaning out clay pockets.

Several operators in the Valley have used steam shovels with success on very uneven surfaces. Rock projections so interfere with continuous operation that great patience is required, and the operator must be prepared for much lost time both in loading and in moving. The shovel will not excavate from deep pockets, hence much hand

work must follow, but where a depth of several feet of clay is encountered, the steam shovel is much more economical than hand loading. The smaller types of tractor, or caterpillar shovels with dippers not more than ¾ yard in size, are best adapted for such work.

The actual cost of steam shovel stripping varies greatly in different localities. In the Florida phosphate fields the contract price for steam shovel stripping was 20 cents per cubic yard in 1912. At several cement plant quarries visited by the writer in 1916 and 1917 the cost of steam shovel stripping varied from 11 to 16 cents per cubic yard including transportation to the dump. The Dolomite Products Company of Cleveland, Ohio, in substituting a steam shovel for hand loading of soil overburden found that the daily cost of handling the same amount of material was reduced from $137.50 to $35. per day.

An interesting modification in the use of the steam shovel has been proposed, but has not yet been tried. It is suggested that rock and soil be blasted down together, the serviceable stone sorted out and removed, and a steam shovel employed to clean up the soil and waste on the quarry floor. All good stone in the waste material could be thrown aside while loading. The adherence of mud to the rock during rainy weather as previously mentioned is a disadvantage, but as waste is much more slowly loaded than good rock by hand methods, the proposed scheme has some merit.

A method now being tried in the Valley, and which according to report has been successfully used elsewhere, involves the use of the steam shovel for both rock and clay in the upper part of the deposit. The great bulk of the clay in pockets and seams is usually confined to the upper 6 to 12 feet of the limestone deposit, thus if a cut 6 to 12 feet deep is made, the clay may be loaded into cars with a small tractor shovel having a ½ yard dipper, and the rock masses drilled and blasted as they are encountered. The rock thus obtained may be loaded into separate cars, but it is not deemed advisable to do so, for it is difficult if not impossible to load clean rock with a steam shovel where rock and soil are mixed. As now conducted the surface cut is at the margin of the quarry excavation, and all rock masses encountered are thrown over the edge where they are loaded at the quarry floor. This makes possible a clean separation of rock and soil.

The method as thus briefly outlined is one of the most promising yet proposed, for it permits removal of almost the entire mass of clay with the steam shovel, and leaves the underlying limestone ledge relatively clean and well prepared for ordinary methods of quarrying.

One operator plans to erect a washing plant, and in the writer's opinion this is the best solution of the stripping problem in large quarries. Small operators probably could not employ such equipment profitably, but where 250 tons or more of rock are quarried per day, there is no evident reason why a washing and screening equipment could not be employed with profit. Most operators will admit that with present high wages the steam shovel is far more efficient than hand methods for loading either rock or soil. The great weakness of the steam shovel is its inability to sort the materials that it loads, and hand methods are employed because it is necessary to sort the stone according to size, and to separate it from the clay. The washing and screening equipment accomplishes the necessary sizing and purification of the rock, and thus permits steam shovel loading. Where a heavy overburden is encountered, the bulk of the material may be stripped separately as a preliminary

operation, but all clay that occurs in close association with the rock may be separated in the washing plant.

At one lime plant in Pennsylvania the rock is all loaded with steam shovels, passed through a jaw crusher with an 8-inch opening, and carried in a pan conveyor to a rotary screen. The larger sizes are conveyed to the kilns, and the smaller sizes to railroad cars for flux or road work. With the addition of nozzles and other necessary equipment to wash the stone during its passage through the rotary screen, this type of plant would be ideal for rock mixed with clay as in the valley region. It would also prepare the way for better utilization of the smaller sizes of stone, materials which are now mostly mixed with soil and thrown away as waste.

Occasionally clay-filled cavities of large size are encountered. In one quarry in Virginia a mass of clay 60 feet across reached to the bottom of an 80-foot excavation. On account of the slow hand methods employed, its removal seriously curtailed the output of the plant for two years. Obviously it would have been easy for a steam shovel, operating on the quarry floor, to remove such a mass in a few weeks.

Deep erosion cavities often occur in places where it is difficult or impossible to employ ordinary mechanical methods of removal. Several instances have been observed where a succession of laborers shovel the clay from bench to bench until it is finally thrown to a point from which it can be loaded into cars or dump carts. Such methods date back to antiquity, and involve a labor charge that is prohibitive under modern wage conditions. If a clam-shell bucket, dragline excavator, or similar device cannot be employed, it is suggested that the soil be mechanically elevated by means of some type of wagon-loading equipment now so generally used. A portable belt or bucket elevator is easily placed in position, and may be operated at low cost by electric motor or gasoline engine. With such simple equipment two men could easily do the work of 6 or 7.

One operator has solved the stripping problem simply and effectively by removing the lower ledges of high grade lime stones without disturbing the overlying inferior rock and clay. From the quarry wall an entry is driven into the ledge, and drifts are projected right and left. Certain disadvantages are connected with mining limestone, and the method is to be recommended only where a sound roof is obtainable, and where an excessive thickness of soil or waste rock overburden is encountered.

As a result of his observations the writer concludes that removal of the overburden is unusually difficult in limestone quarries in the Shenandoah Valley, and that stripping expense is consequently one of the chief items of quarry cost. It would be very helpful to the Bureau to obtain from operators who have the data definite figures showing the proportion stripping costs bear to total quarry cost.

The writer is convinced that if mechanical means of removing the overburden were more generally employed the stripping expense would be greatly reduced. Stripping costs in the Valley by hand methods vary from 20 to 45 cents per cubic yard for average conditions and are very much higher where clay removal is exceptionally difficult. The cost of hydraulic stripping varies from 3 to 11 cents per cubic yard while steam shovel operation costs from 16 to 30 cents per cubic yard.

A decision as to the best methods and types of equipment to be used in stripping is open for discussion, and it is hoped that many operators will act upon the suggestion that they submit their ideas to the Bureau of Mines.

Cars for Pits and Quarries

THE writer recently visited some quarries where he found one-horse dump carts in use for hauling stone from the ledge to the crusher. More recently he saw a photograph taken in a large quarry of a steam shovel loading blasted rock into a one-horse dump cart.

There is no more expensive way of hauling rock than with a dump cart. Yet it seems that it is still done in many sections of the country. The methods of transporting materials in pits and quarries has changed to such a great extent that it has been difficult to keep abreast of the times. This has been due partially to the change in the method of loading material at the ledge and in the pit, and to the fact that there has been a vast improvement in the kinds and designs of vehicles that have been used. This means that it is now possible to use such vehicles and machines as will easily increase the production and at the same time reduce the cost.

It must be realized in operating crushers, that in most cases the capacity, both rated and actual, is generally much greater than is usually produced in a day. Thus if by means of the type of vehicle used to transport the rock to the crusher, the output is materially increased, the investment in the vehicles and other transportation plant is quickly paid for out of the increased earnings.

It is a wrong principle to be satisfied with the plant one has on hand and in operation, when there is on the market a better type of machine that will assist in increasing the earnings. This is the secret of success in operating quarries and pits.

The type of vehicle used must depend upon the method of loading the vehicle. It is manifestly wrong to have a high type of car or vehicle if loading is done by hand and to use a low one when steam shovels are used, yet strange to say this is done in many cases. In one quarry the writer visited he found six-yard contractor's two-way dump carts, nearly 5 feet high, being used. Men were loading these by hand, and naturally all stone had to be broken to such a size that could be thrown into the car, the stone being much smaller than necessary to go into the crusher. This means an extra cost for breaking. The cost of loading was bound to be excessive as men do the least work in raising material vertically by hand or with a shovel. A low type of car should have been used in this quarry.

In another quarry the same type of cars were being used, but instead of loading them directly by hand, one-horse dump carts were loaded by the men and the carts were hauled up an inclined runway onto a platform, from which the stone was dumped from the cart into the cars. This allowed of larger stones being loaded, and saved some sledging, but it was expensive loading and hauling and meant that all the material had to be re-handled. In both of these cases a low type of quarry car should have been used.

In contrast to this, in another large quarry, a low type of car, meant for hand loading, was being used, in spite of the fact that a steam shovel was being used to do the loading at the ledge. The reason for this was that these cars dumped from a tipple and so as to continue the use of the tipple the same type of car was used, although it meant much waste time for the shovel. Part of the dipper load was wasted on each side of the car and the dipper had to be lowered so as to prevent breaking the car when the rock fell into it. The fact that the cars were small, meant frequent waits for the shovel to move and place cars.

This case shows the fallacy of keeping the old equipment. The type of car used was ideal for hand loading,

and a tipple was necessary to dump this type of car, but when the steam shovel was installed then it was necessary to install a new type of car and with them change the method of dumping.

Loading and dumping should govern the type of car to be used. If hand loading is done, the lowest type of car obtainable should be used, while for machine loading a higher type can be used, and also one of larger capacity; yet the size of the car in quarries must depend somewhat upon the size and mouth of the crusher, while with sand and gravel, the screening or washing plant will help to govern the size.

The dumping of the car is important, but in most cases this can be changed to suit the other conditions, but it is evident that a side dump car cannot be used on a tipple. There should be no trouble, though, to change the tracks in most cases so as to do away with a tipple and make it possible to side dump.

A decade or two ago the only choice that an operator had in vehicles was that of using a one-horse dump cart or cars. In those days there was little machinery used to load vehicles, as most of this was done by hand, consequently the vehicles were small. In these days it was not such a bad proposition to use the carts, but even small cars were much cheaper, as these carry a much larger load and the cost of hauling them is less than that of carts. Then too, one horse can operate two or more cars, while it takes a horse for each cart.

With the coming of the patented or drop-bottom dump wagons, some of these were used in quarries and sand and gravel pits, but they never came into extensive use, due to the fact that it was not an easy matter to drive the wagon over a crusher opening or a chute. Thus the load had to be dumped to one side and rehandled.

For hand loading, wagons, too, are high as compared to the low type of quarry cars, hence this prevented their use a decade or two ago.

With the coming of the steam shovel for loading in pits and quarries, the wagon was not used extensively, as auto trucks likewise came into use about the same time, so that when loading was done to make final deliveries the truck, for long hauls and for its much larger load, was preferred over the wagon.

This was the first use of trucks for pit and quarry operation. Today the truck is being used to some extent for hauling material from the pit or quarry to the plant. This use is gradually growing and is likely to become general.

It is a more flexible hauling unit and saves the laying and maintenance of a system of tracks and for small operations it should be cheaper than cars, but the load is never likely to exceed 6 or 7 tons with one truck or about 12 tons using a trailer. This means a man for this tonnage, while for larger operations it is possible with a gasoline motor or an electric locomotive, and one or two men, to haul 20 to 100 tons a trip. This means a less cost for hauling, while the loading machinery will lose less time, reducing that cost, while the plant should show a greater production, thus reducing that cost and giving more product to sell.

Cars will never be entirely supplanted in pit and quarry operation, and in most cases will prove to be the cheapest vehicle for transporting materials. In some individual cases, other types of vehicles may be better adapted to the local conditions.

Thus every operator should have the most intimate knowledge of all types and kinds of cars that are suitable for his work and know that he is using the kind of car that will mean the largest output for the least cost.

The Use of Shovels

ALTHOUGH in pit and quarry operations, machines are rapidly taking the place of hand shovels in handling most materials, yet there will always be some use of men with shovels to do certain work.

Wherever possible hand shoveling should be eliminated, for it is both a slow and expensive method of handling material, more especially stone. But if hand shovels are to be used then they should be handled properly. It is quite surprising how many men who use shovels have little idea of the proper way to handle them. Like a pick or sledge they seem to think that any way, so they do their work, is all right, little realizing that to use any tool in an improper fashion means to make them awkward, and cause them to put forth much effort and energy, yet accomplish but little work.

Only a few days ago the writer stood watching two men rehandling dirt from a deep hole. Both were using long handle shovels. The writer timed each. One man working about as continuously as the other, shoveled twelve shovelfuls in a minute, while the other handled about eight and a half, or seventeen in two minutes. The load on each shovel was about the same. The timing was kept up for about ten minutes, so that a fair average was obtained. Upon questioning the men it was found that the one throwing twelve in a minute had done laboring work, using a shovel most of the time for a period of about twenty years, while the one throwing but eight and a half had done similar work for about twenty-five years. Both men are between forty-five and fifty years of age.

Here were two men who should both have been experts, yet one was a good shoveler, using nearly the correct motions, while the other was an indifferent shoveler due to the fact that in spite of his long experience he did not know the correct motions of shoveling. One was doing his work mostly with his back while the other was depending almost entirely upon his arms.

The difference meant fatigue for the one, while the employer was obtaining forty per cent more work from one man than from the other.

Some will say that this is the idea of a theorist, and that men differ so in physical strength and the dexterity of their movements that it is possible to find men who will do twice as much work as others. This is true, for men differ much in their strength and dexterity; but it has been proven in many cases that men can be taught how to work and so trained as to be as expert in shoveling as those to whom the art of shoveling seem to come naturally.

One example of this occurred only a short time ago. The writer had a man in his employ who was a wonderful expert with a shovel. Long years of work had made his muscles like steel, and he knew the exact motions that gave him rapidity without tiring himself. He, like the writer, knew that men could be taught how to use tools, for many years before a fellow laborer had taught him how to shovel. The result was the writer put him to work to train some perfectly green men.

One in particular was a boy about twenty-one years of age, discharged from the army as both mentally and physically unfit for the service.

This boy could not shovel more than two or three cubic yards in a day. He was first taught the motions with his back, then those with the legs and knees, and last the arm motions. When he got out of these motions he was stopped and told to set himself and start fresh. The result was that within a week or ten days he had learned enough about shoveling to handle about seven cubic yards in a

day, and to his great delight he was not tired and soon came to enjoy his work.

Each week he showed marked improvement, doing more work with less fatigue. After six weeks of training he was put to work with the expert on a job where he had to go and come with each shovelful with the expert, and to everyone's surprise, including his own, he was able to cast eighteen cubic yards of sand in a ten hour day. The novice had become an expert shoveler and he found he was not used up as much with his work as he had been previously when he was moving only a few yards of dirt. His muscles had become trained and hardened to the work. This man had never used a shovel before, as he had been an east side bum in New York city, living by petty thieving. When he attempted to earn a living with a shovel he had been promptly discharged as incompetent.

This is only one of a number of striking examples of how men have been trained to use tools properly. There can be no doubt that it pays to train men.

To do this, though, the proper kinds of tools must first be placed in the men's hands and those who are to do the training and teaching must themselves know the proper use of the tools, and the motions that are needed.

It is a singular fact that most workmen who have not been trained properly, make too many rather than too few motions in handling tools. This is true even of as small a tool as a monkey wrench, or a trowel in the hands of a bricklayer. With larger tools it is likely to be more so, with the result that men quickly fatigue themselves, and must have more rest spells than when they have eliminated the superfluous motions.

Men in performing physical labor must take certain rest spells, and the periods of rest have much to do in cutting down the amount of work done in a day. For instance, a man knowing how to handle a shovel is not likely to spell himself during a minute more than ten seconds, and he can learn to do with about ten or twelve seconds in a period of two and one-half minutes, while the man who does not know how to shovel and is using extra motions will spell himself every half minute, and his periods of rest are likely to be nearly as long and possibly longer than his working periods. Men should never be scolded for taking a reasonable rest spell, but it is the business of the employer and his foremen to so handle their men that the men will not need excessive periods of rest, and if the workmen are trained to handle their tools properly the rest spell will be less frequent and of reasonable length.

The Niagara Stone Products Co., Bellefontaine, Ohio, has been incorporated for $200,000. The officers of this company are, K. C. Flickinger, secretary-treasurer, C. W. Hert, President and D. A. Frampton, vice-president.

The Saticoy Rock Co., Ventura, Calif., has been incorporated with a capital of $150,000. Incorporators: A. G. Wright of Fullerton, C. A. Beall of Los Angeles, A. H. Stovall of Santa Paula and Charlotte Stephens and D. G. Bowker of Ventura.

The Oolitic Limestone Co., Indianapolis, Ind., has been incorporated with a capital of $1,000,000. The directors of the company are E. C. Shiremen, James Gin and Everett Lowden of Martinsville, Ind. The offices of the company are in the Indiana Trust Company Building, at Indianapolis.

The Phoenic Stone Co., Manhattan, N. Y., has been incorporated with a capital of $50,000. Directors: T. F. Conlon, R. W. Owens, Jr., J. J. McGinty. Attorneys: Van Doren, Conklin, McNevin and McClenthen, 31 Nassau St., New York City.

Sand and Gravel for New Minnesota Highways

THE Guaranteed Gravel & Sand Company of Mankato, Minn., has for the last year been successfully operating a new gravel plant a few miles out of Mankato close by the works of the Carney Cement Company. This promising concern which, under the direction of J. G. Emery, president, has already established itself in the district it serves, is operating on funds raised in the locality. The business is incorporated for $50,000, all of which is paid in.

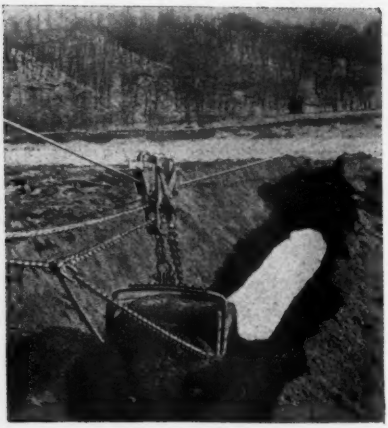
The firm was known at the time of its incorporation as the River Sand & Gravel Company. The choice of name was due to the fact that the gravel is excavated from a bank of the Blue Earth River. This name, however, was changed to the present title of the concern in deference to the River Sand & Gravel Company of Winona, Minn., who dredge sand and gravel from the Mississippi River.

The deposit of sand and gravel which the company is working covers about 18 acres. It underlies from 6 to 8 inches of overburden and runs to a depth of 65 feet. It is singularly free from chalk, slate, silt, clay and any organic impurities, which would make it undesirable as an aggregate for high class concrete work. The material runs 50 per cent sand. Half of this is suitable for a plastering sand. The chief materials that the owners intend to produce is gravel for roofing. for pebble dash, a size running from pebble dash to 1 inch and a size from 1 inch to 2½ inches. It is the intention to put in later a small crusher for reducing oversize, if enough of this material to pay for the installation of the crusher is encountered.

The plant is located on what was a bank of the old bed of the Blue Earth River. The cableway extends across this original river bed and over a gravel bank covered with brush, poplars and willows, reaching into a clear gravel deposit, after which comes the Blue Earth River, a comparatively small stream of water. To reach the material it was necessary, in the first place to clear the gravel bank of vegetation and to strip off the overburden. As this work was carried forward andoverburden and material excavated, a pond was formed by seepage from the Blue Earth River. This proximity of the river to the plant guarantees, of course, a supply of water for the washing operation.

The material is excavated by a Sauerman dragline outfit, operating from a 90 foot mast with a one yard dump bucket over an 800 foot span. The system is operated from a hoist made by the American Hoist & Derrick Company of St. Paul, Minn., powered by an 80 horsepower engine, also the product of that concern.

Work on the erection of the plant began in April, 1921, and was not completed until about December 1st of that year. As it was too late for washing the gravel, the company began the production of pit run material and continued so to operate throughout the winter. This activity got the deposit in good condition for working in the springtime. One of the photographs here included shows the bucket operating in earth on which snow has fallen. As the winters in this section are quite severe the work between the time the plant was erected and the time spring weather began was in many cases done under great difficulties. Particularly did the matter of lubrication present a serious problem. It was hard to keep the blocks and sheaves free enough for operation. The grease kept congealing regularly, and it was only after a number of lubrication experts had visited the plant



The Plant Operated All Through a Minnesota Winter

and had worked out their problem that satisfactory results were secured.

When the spring season began the company put in operation its washing system. At present the material is dumped from the cableway bucket into a hopper above the screens. Between this point and the screens it passes a grizzly, which knocks out oversize materials, and then passes through a system of Dull inclined conical screens equipped with a condenser. Water for the washing operation is supplied by a Swaby 2½ inch centrifugal pump, which throws 300 gallons of water per minute. This water enters the system at the point where the sand enters the screens. The screens are powered by a 10 horsepower crude oil "Y" engine manufactured by the Fairbanks-Morse Company, and the pump by another engine of identically the same description.

The plant has a capacity of about 400 yards of washed and screened product each 10 hour working day. There is plenty of work to do there, for some of the very best road jobs in the state are under way in the vicinity.

Most of the material produced by the plant is shipped by railroad, but a considerable truck business is also handled. Cars are loaded at one side of the plant and trucks at the other.

McGraths Capitalize at Half Million

Increase of its capitalization to a half million dollars, and building of an additional plant at Joliet, Ill., is announced by the McGrath Sand and Gravel Company of this city, incident to the filing of new articles of incorporation with the secretary of state. The company was formerly incorporated for $100,000. With erection of the plant at Joliet the company will have five plants in Central Illinois.

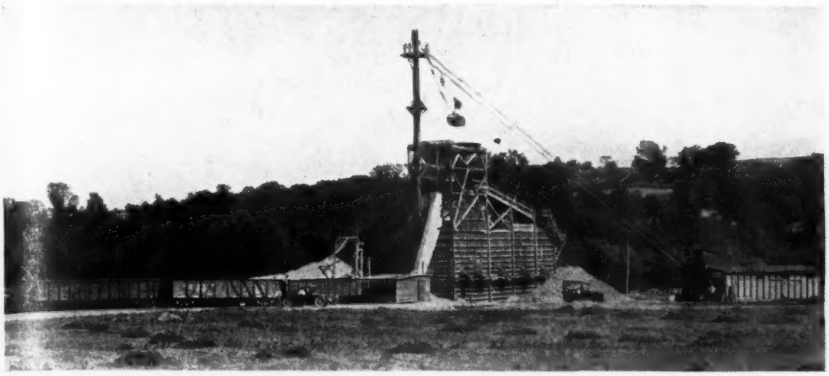
The plant at Joliet is being built on the Gauger land, to which the company has taken title, along the Michigan central railway, at the east side of town. Construction will continue throughout the winter, for completion by March first. Approximately one mile of track already has been laid to serve the plant.

The McGrath Sand and Gravel company's success in this line of endeavor has been marked. Around a nucleus of three brothers, J. W. McGrath, T. E. McGrath and T. P. McGrath, the company, starting fifteen years ago, has developed from one small plant with a capacity of one car per day, to five plants, shipping 150 cars per day. The other four plants are located at Mackinaw, Pekin, Chillicothe and Forreston, Ill. The company maintains its general offices at Lincoln.

The Joliet plant is being constructed to produce forty cars per day. Two immense crushers are being erected for reducing the boulders to commercial sizes. The company will produce material for state road work, railroad ballast and all commercial uses.

It is perhaps remarkable among commercial affairs when three brothers of the same family organize and develop a business with the evident success that this concern has had. J. W. McGrath supervises the construction and operation of the various plants. T. E. McGrath has charge of traffic and selling, and T. P. McGrath accounting and credit.

The company maintains sales agencies in Bloomington, Springfield, Freeport, Galesburg and Joliet. The stock is practically all owned in Lincoln.—Lincoln, (Ill.) Evening Courier.

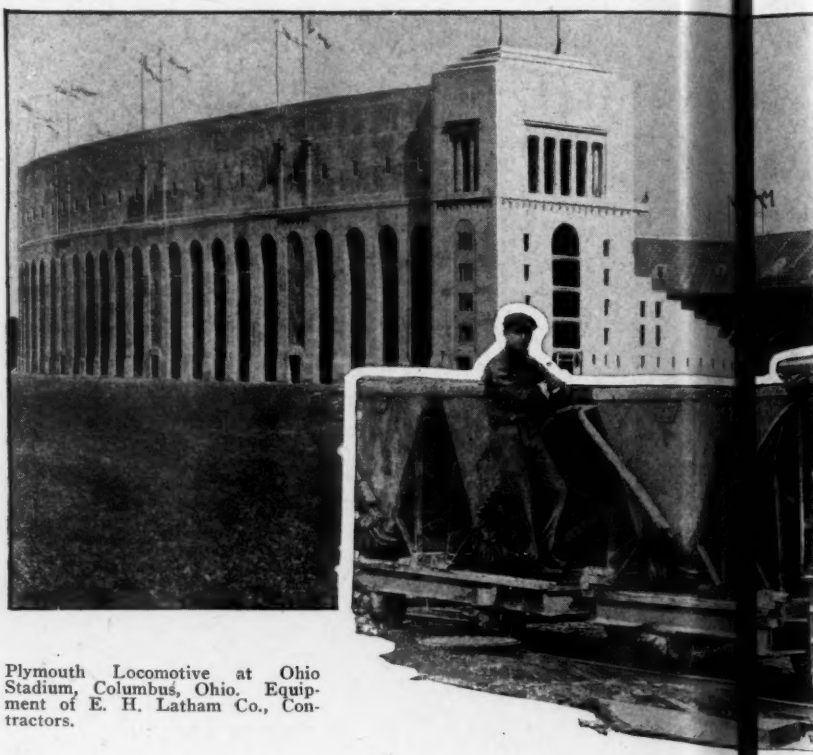


Above — General View of Plant of Guaranteed Gravel & Sand Co. of Mankato, Minn.

Above — View of Plant from End of Cut.

Above—Cut, Looking Down from Hopper.

At Left—The Plant Has a Big Truck, as well as a Railroad Trade.



Plymouth Locomotive at Ohio Stadium, Columbus, Ohio. Equipment of E. H. Latham Co., Contractors.

Stadium Glorifies Ohio State

Ohio State is a magnificent University. She loves climax in achievement. She loves to glorify. That she m glorify, Ohio State Built a Stadium.

Built it a third of a mile in circumference. Built it to 63,000 pulsating fans. Poured into it 30,000 cubic yards of crete. Gave it strength by using 1,250 tons of reinforcing s Built it over and around 4,400 tons of structural steel. 1,750,000 board measure feet of lumber in construction of fo Built it 107 feet high. Built it in little more than 10 months.

The Fate-Root-He

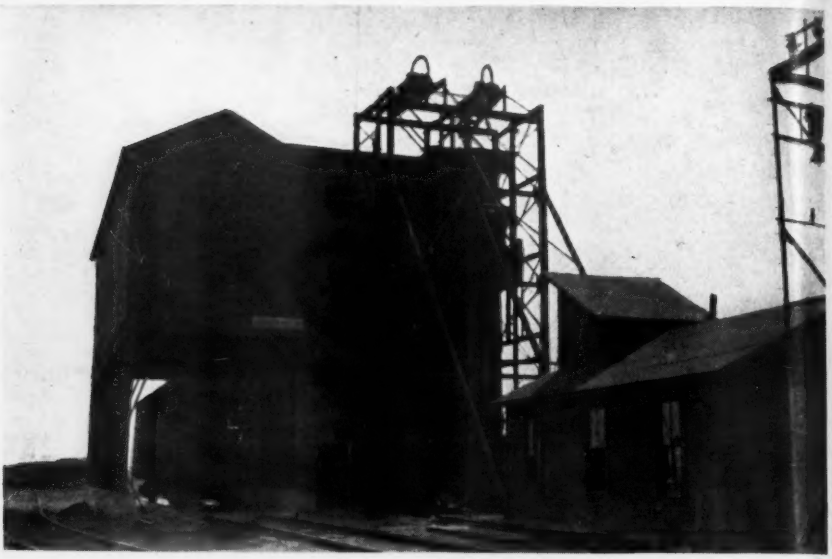
io State Glorifies Wolverines

The alumni, student body, and friends everywhere, went wn into their jeans for $1,400,000, to pay for this climax. en Ohio State glorified,—glorified the Wolverines.

Have we forgotten anything? We have not. In it all she rified an Ohio product, the PLYMOUTH Gasoline Locomo-e. It hauled the concrete from mixing plant to derrick, and haved so well that Edgar H. Latham, of E. H. Latham mpany, contractors, wrote us, "Your Locomotive did excellent rk."

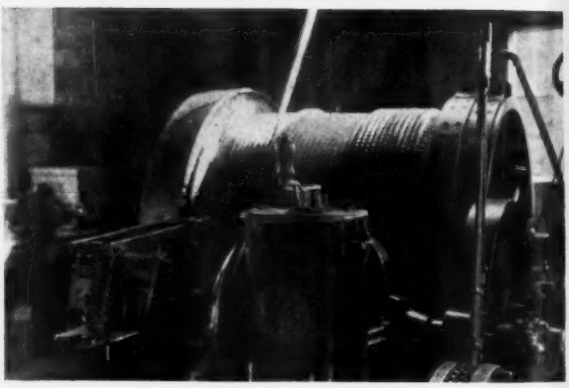
Write for Bulletins

., Plymouth, Ohio



Above — Plant of Phoenix Gypsum Co. Hoist House in Foreground.

Phoenix Gypsum Company
Oakfield, N. Y.



Above — Hoist for Balanced Lift System which Brings Rock to the Mill.

At Left—View of Mill From Side. Note Car in Shaft Being Dumped.

Phoenix Gypsum Company Grinds Raw Rock

AT Oakfield, New York, on the West Shore Railroad, is located the mine and crushing plant of the Phoenix Gypsum Company. Operations at this plant were begun in December, 1920 and have been continued on a fairly extensive scale ever since. The purpose of the plant is to produce raw crushed gypsum. No calcined material is produced, but the company will later produce an extensive line of calcined material at a new plant which will be located near Akron, not a great distance from the Oakfield workings. The operations, present and projected, in the Akron district are known as those of the American Gypsum Co., with which the Phoenix Gypsum Company is associated and with which it maintains offices in common in Rochester, New York, under the management of Mr. Harry C. Nobles, president. The plant and mill of the Phoenix Gypsum Company at Oakfield, as well as the operations of the American Gypsum Company around Akron, are in charge of Mr. L. E. Chamberlain, superintendent.

At the Oakfield workings there is a 4 foot seam which the company is now working in four places from a main haulageway running in about ¼-mile from the bottom of a vertical shaft. Under these conditions the company is pushing the work into a good deposit of gypsum.

The Oakfield district now produces more gypsum than any other section of the state. Located close to the Phoenix plant, along the West Shore Line, are the plants of the Niagara Gypsum Company and the large plant of the United States Gypsum Company. The stone throughout the district is very suitable for calcination, is white in color and yields nearly white plaster. An analysis of material from two of the mines in Genesee County, in the same deposit which the Phoenix Company is working, show a chemical constitution as follows:

SiO_2	1.03	0.40
Al_2O_3	.41	2.97
Fe_2O_3	1.27	.77
CaO	30.74	30.76
MgO	2.01	1.53
SO_3	42.39	43.78
CO_2	2.20	2.80
H_2O	18.19	17.53
	98,24	100.54
Gypsum calculated ..	91.27	94.26

As stated above, the entire output of the Phoenix Gypsum Company is crushed raw gypsum. This is used chiefly by manufacturers of Portland cement. The tendency of freshly made Portland cement to set so quickly that it cannot be handled with convenience is well known, and the capacity of gypsum, raw or calcined, for retarding this set is equally well known. Many cements contain as high as 3 per cent of gypsum by mass. The gypsum is added at the Portland cement plants, just before the final grinding, so that it can be thoroughly mixed, without being put through an extra operation. Raw or calcined gypsum produces the same effect, but the calcined material is not nearly so much in demand with cement manufacturers as the raw gypsum. About 80 per cent of all the material that goes to Portland cement plants for use as retarder is raw gypsum.

Material is secured at the working places by the process usually employed throughout the New York gypsum fields. Drill runners are kept working during the day time with Scranton electric rock drills, drilling holes for the charges of dynamite which are set off each night. These blasts bring down considerable quantities of material for

loading into mine cars during the mining period. Material that is shot down is reduced to one-man size by sledging or by the use of jackhammers.

When the stone is reduced to suitable size for handling it is loaded by contract workers into 2-ton mine cars. These cars are picked up and made into trains at the haulageway, along which they are drawn by a Plymouth gasoline locomotive. This piece of equipment is used because it is possible to keep the mine well ventilated and the fumes of the gasoline engine do not cause any inconvenience to the workers.

The mine is drained by two Taber centrifugal pumps with 4-inch intake and 5-inch discharge lines.

Trains of 2-ton mine cars loaded with gypsum are drawn to the foot of the vertical shaft which extends above ground level to the head frame at the top of the mill building. At the top of this head frame the car of gypsum opens a door and discharges the contents by dumping forward. The elevation of material up this shaft is on the balanced car principle, a car of gypsum being drawn up while an empty car is descending, thus using power only for the elevation of the gypsum itself. A single drum Flory hoist is used for the operation of cars in this head frame. The hoist is geared to a General Electric motor.

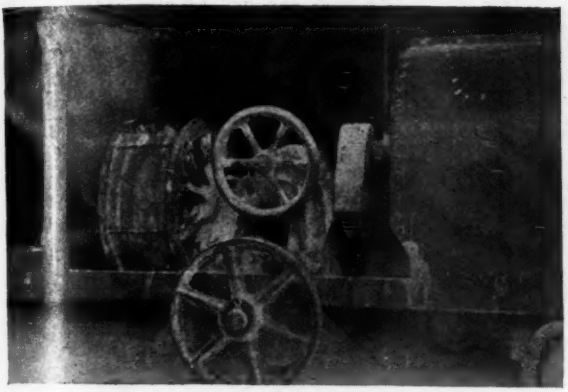
It may be well to mention at this point that, except for the gasoline locomotive in the mine, electric power is used exclusively, Niagara River current is received at 11,000 volts and transformed to 440 volts. An amount of current is regenerated by a General Electric rotary converter, the direct current being required for the drills in the mine and for an electric trolley locomotive system, which the company expects to install when the mining operations have been put on a more extensive basis.

Cars of gypsum are dumped from the top of the head frame over into a hopper above a Jeffrey hammer mill which reduces it to an average of half an inch. In connection with the hopper, from which the hammer mill is fed is an automatic weighing device built around a scale manufactured by the Buffalo Scale Company. This device weighs cars of material as they go from the mine.

The product of the hammer mill is picked up without previous screening by a screw conveyor 8 feet in length, which passes the stone to a chain bucket elevator 40 feet between centers running to loading bins for passing directly to cars.

The crushed gypsum may be sent to the storage bins instead of the car-loading bins mentioned above. The method of accomplishing this loading of storage bins is quite efficient. The elevator, at such times as it is desired to pass stone into storage bins, is made to discharge by the setting of a flop-gate on the short belt running to the center of the conveyor belt which passes over all bins. The motor from which this conveyor belt is driven is operated from a double throw switch which permits the running of the motor in either direction. Thus the belt may be made to travel in a right hand or left hand direction from the end of the short loading belt. Scrapers arranged at intervals on the conveyor belt make it possible to drop the material at any bin desired. This method is working out very satisfactorily, and appears to be a quite efficient way of loading solid material into any one of a series of bins arranged in a straight line, when there is not sufficient headroom to arrange chutes to each of these bins, and where it is not desired to raise the material to a sufficient height to permit the use of separate chutes to each bin.

A considerable part of the material produced at this mine is loaded into



Box Cars are Filled by a Fairmont Loader

box cars. This operation is taken care of by a car loader manufactured by the Fairmount Mining Machinery Company of Fairmont, Virginia. This device, shown in one of the accompanying photographs, takes in material through a hopper at one end, and throws it sideways towards both ends of the cars until the car is filled as far as the doors. The hopper end of the loader extends through the open door of the box car on the side near the plant and receives its supply of gypsum through a chute running from the bins.

Two Valuable Volumes

Two new volumes of much interest to many operators in the pit and quarry industries have just been brought out by John Wiley & Sons, Inc., of New York.

One of these is entitled "Belt Conveyors and Belt Elevators," and is written by Frederick V. Hetzel, M. E., Member of the American Society of Mechanical Engineers. The author's purpose in writiny this book was to make a very practical volume explaining principles and the reasons for doing things. Belt conveyors and belt elevators are so generally useful and suit so many kinds of materials, under so many operating conditions, that they are used to illustrate some of the principles underlying the general subject of the reason and use of conveying and elevating machinery.

The book is divided into twenty-three chapters under such headings as: "Development of Belt Conveyors," "Belts and Belt Manufacture," "Driving a Belt," "Loading the Belt," "Special Uses of Belt Conveyors," "Centrifugal Discharge Elevators," "Continuous Bucket Elevators," "Elevator Boots," "Inclined Elevators," etc.

The book contains over 300 pages, with a complete index, and is illustrated with nearly 300 figures. The price of the book is $5.00.

The second volume to which reference has been made, is uniform with the above in size and style but runs to more than 600 pages and sells for $6.50. It is a second edition of "Cements, Limes and Plasters," by Edwin C. Eckel, C. E., a well-known authority on this subject, and the first editor of whose work under this title has become a classic. In addition to numerous figures showing the installation of equipment in these plants, it contains maps showing the distribution of these materials.

The Holmes Sand & Gravel Co., Millersburg, Ohio, has been incorporated with a capital of $100,000. C. O. Geib, P. H. Damon, W. F. Carver, J. W. Fenton and E. R. Defenbaugh.

Messrs. Elson and Rynee of San Francisco, Calif., are driving an adit to tap the subterranean gravel deposit under the Sledge Mine, at Confidence, Calif. Under their direction, the work is going ahead rapidly.

The plant of the San Bernardino Valley Lime and Rock Co., at Colton, Calif., which has been under construction for the last two years, has recently been put in operation. The lime deposit is located at Vertemont, and the rock is shipped to the kilns at Colton to be burned. Each kiln has a capacity of 150 to 200 barrels daily. The officers of the company are M. P. Bates, president; J. D. Baugh, manager; and J. W. Bates, secretary.

Program Shaping Up

National Crushed Stone Association Getting Ready for Chicago Convention

January 15, 16 and 17 are the dates for the convention of the National Crushed Stone Association at Chicago. The program committee is at work and expects to have a complete program whipped into shape at an early date. As at present arranged it is as follows:

MONDAY, JANUARY 15

10:00 A. M.

1. President's Address
2. Secretary and Treasurer's Report
3. Report of Research and other standing committees
4. Talk of representative of U. S. Department of Commerce or Interstate Commerce Commission on Transportation Situation
5. Talk on Transportation Situation from the point of view of the railroads by prominent railway executive

12:30 A. M.

Luncheon by Groups (separate rooms)
Agricultural Limestone Producers
Ballast Producers
Concrete Aggregate Producers
Granite Quarry Men
Machinery, Equipment and Material Manufacturers

AFTERNOON SESSION

2:00 P. M.

1. Paper on "Information and Data That a Banker Wants to Know About a Quarry Operation Before He Will Help Finance It." By a prominent Chicago banker
2. Paper on "Valuation of Stone Deposits Including Exploration of Quarry Property Geological Data, Exploration Possibilities, etc." Designed to bring out the factors in a stone deposit which make it worth developing as a crushed stone property; and to furnish some basis for a reasonable valuation of undeveloped quarry property, taking into account a study of markets and commercial possibilities as well as the geology, quality of stone, etc.
3. Full and complete discussion from the floor of subjects 1 and 2 above

TUESDAY, JANUARY 16

10:00 A. M.

The entire day to be devoted to full and complete discussion of "Quarry Operation" under the following heads:

1. Stripping
2. Drilling and Blasting
3. Handling Stone in Quarry
4. Quarry Transportation
5. Primary Breakers
6. Secondary Breakers
7. Screening and Sizing
8. Storage and Shipping

Each one of these subjects will be handled by a paper contributed by some one who has had special experience in that particular subject or who is particularly well posted on the field as a whole. The discussion of each subject is to be led by two or three others who have come prepared to discuss the paper presented. It is the intention to have the original paper on each one of these eight subjects placed in the hands of the chairman of the program committee at least three weeks prior to the convention. These papers will be edited, printed and distributed to each and every member, if possible, several days prior to the convention, so that the time of the convention can be devoted largely to a free-for-all discussion of these subjects, the papers being read merely by title or in the form of a brief synopsis.

TUESDAY LUNCHEON

12:30 A. M.

Luncheon by Territorial Groups, Eastern, Central, Southern and Western

2:00 P. M.

Continuation of morning program

7:00 P. M.

Annual Dinner. Addresses by William H. Finley, President of the Chicago & North-Western Railway; C. E. Spens, vice-president of the Burlington Railroad and at present federal fuel administrator, and others.

WEDNESDAY, JANUARY 17

10:00 A. M.

Discussion of Quarry Management

1. Cost Accounting Methods
2. Overhead, Depletion, Depreciation, Insurance, etc.
3. Cost Experience—Summaries of Cost

These subjects will be covered by a general paper contributed by one or more operators, and will be fully discussed on the floor at the convention

11:00 A. M.

Merchandising Quarry Products

1. Sales Organization
2. Sales through Dealers—Allowance for commission, etc.
3. Prices and Discounts
4. Effect of Car Shortage and Traffic Uncertainties, etc.

12:30 P. M.

Luncheon
General get-together, wind-up Luncheon

WEDNESDAY AFTERNOON

2:00 P. M.

Discussion of Uses of Crushed Stone, Road Stone and Concrete Aggregates—paper by representative of the U. S. Bureau of Standards and prominent highway engineers

2. Railway Ballast—Paper or talk by representative of the American Railway Engineering Association Committee on Railway Ballast
3. Fluxing Stone—Paper or talk by prominent Iron or Steel Chemist on kinds of fluxing stone and their particular uses
4. Agricultural Limestone—Paper or talk by Agricultural Experiment Station man or some prominent user of agricultural limestone
5. Special Uses of Crushed Stone—Paper by prominent operators on various minor uses of crushed stone, such as chicken grits, patent roofing, pebble dash, etc.

Election of Officers

Frank Farrington's Business Talks

No. 9—Can You Sell Yourself?

You offer yourself for sale.

In other words, you want somebody to buy your services, your time, your energy, your efforts.

If you have a position now, a pretty good position, you may think you have made the sale and need worry no longer.

In operating a store would it be good business to make no effort to hold the trade of the individual already a steady customer?

The merchant making no such effort would lose his best customers.

You should work to keep your employer sold on your usefulness so you can hold your position, and also so you can get a larger salary.

The probabilities are that the best prospective purchaser of your services is he who has already secured them and knows whether they are satisfactory.

If you can give your present customer satisfaction, making him like your services, you should be able to make your services valuable enough so he will pay a gradually increasing wage for them.

In order to get more money for your services, you must earn more.

You must be worth more before you get it, because an employer is not foolish enough to pay you in advance for what he hopes you are going to do.

Some men reason that because they have held a position for so many months or for so many years they deserve an increase in salary.

You and I know that the concern that would increase its employes' salaries for no other reason than that they had been with it for so many moons, would soon find itself losing money on them.

In order to get more money for yourself, you must make more for the boss.

So, selling yourself is a matter of proving your earning power.

When you sell yourself to a man the first time, you have to show him, convince him that if he gives you the chance, you can earn money for him.

In order to sell yourself again and hold your position or get a raise, you must actually earn more money for him.

And that is all there is to selling yourself, just as it is all there is to selling merchandise—just show the other fellow he will profit by buying.

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Profit in Sand for Polishing

By ALFRED B. SEARLE, Consulting Technologist.

WITH a little salesmanship a profitable side-line for many owners of sand pits is in the production of a sand to be used as a polishing agent. This profit may be gained in several ways, but only two will be mentioned in this article: the first in connection with polishing decorative stones, marble and glass, and the second for polishing metals.

Many stones are of small value until they are polished, but the small amount expended in this treatment greatly increases the prices at which they can be sold. Yet the polishing—to yield a good return—must be done with a material which can be relied upon to the utmost, even in the hands of semi-skilled workers. In days gone by the men employed as polishers bought any kind of sand or stone they fancied and treated it laboriously in order to remove the objectionable materials in it. They worked on small quantities and without proper appliances, but labor was cheap and little was known about the underlying principles involved either in polishing or in preparing the polishing materials. Nowadays labor is too dear for old methods to be continued, and it is precisely for that reason that owners of sand quarries can increase their profits with a little ingenuity and some selling ability.

The Requirements

In order to produce a high polish on any kind of stone or similar material, the surface must be made increasingly smooth by rubbing it with a series of materials each of which is finer than the preceding one. The first treatment may sometimes be done with a planing machine or even with a saw, which gives a fairly flat surface. This surface has then to be made smoother and ever smoother by rubbing. A hard coarse polishing agent will do quite well for the roughest work, but if it is applied near the end of the polishing it will make deep scratches which cannot be eradicated without commencing the polishing all over again.

No single grade of material can be used all through the polishing; a series of grades, each carefully adjusted to the work it has to do, is absolutely necessary for the best and most rapid work. Many materials may be used for this work, but sand is cheap and very effective if properly prepared and its use offers the best return to the makers of polishing agents.

Where Are the Sands?

Sands which can be made suitable for polishing, occur naturally both in loose grains, and in a compact mass as sandstones. These standstones which occur in large masses in many parts of the world and are composed of grains of quartz firmly united with a bond of amorphous silica, can be crushed and then form a sand which is particularly useful for converting into a polishing agent, provided the grains in the stone are of the right kinds. The stone must be sufficiently pure; this can be judged by the lightness of its color and even more accurately by the appearance of the individual grains when viewed through a lens magnifying about 12 diameters or through a microscope. For polishing purposes the sandstone is crushed to powder and so forms a sand, the degree of fineness varying according to the size of the grains which formed the sandstone and to the extent of the grinding. Some sandstones are sawn roughly to shape and are then rubbed on a carborundum wheel so as to give them a moderately smooth face. They are then sold for use as rubbing

stones for effecting a smoothing or preliminary polishing of various materials. The objection to most sandstones is that the bonding agent which unites the particles of silica in the stone makes the stone too hard to be used for polishing purposes. When such stones, or preferably those with a softer bond, are crushed and the dust removed they are similar in character to natural sands.

It does not matter in the least to the polisher whether he uses a crushed sandstone or natural sand, but to the owner of a quarry yielding broken sandstone, the production of an artificial sand offers a further source of profit.

Briefly, then, wherever there is a sand or crushed sandstone which possesess the properties mentioned later, such material is a potential source of polishing sand.

Selecting the Sand

As only sands which consist of sharp grains of pure silica can be used for polishing, quartz is practically the only form of sand used for this purpose. In selecting the sand or sandstone care should be taken, to choose one composed of as nearly pure quartz as possible, for all the other materials which occur in sand are much softer than quartz. They tend to smear instead of polish and also interfere with the action of the quartz. In many cases the impurities can be removed but it is better to start with as pure a sand as possible.

Chemical analysis is sometimes useful, but it may result in a sand being condemned which is a really good polishing agent. The reason is that a chemical analysis reveals all the impurities whereas those which are entirely enclosed within quartz crystals do so little harm that they may be disregarded. Consequently, a good microscopic examination accompanied by a test to separate (a) the clay and silt, and (b) the heavy minerals, is a far better guide to the suitability of the material. Moreover, these are well within the scope of the average superintendent whereas an elaborate chemical analysis is quite another matter.

Quartz, which is one form of silica, is one of the commonest and most widely distributed minerals, and is by far the largest constituent of most sands. It has well-defined crystals which have no marked cleavage, but break with a conchoidal fracture. Its hardness is 7 on Moh's scale—that is to say it is a little harder than feldspar, and can be scratched by topaz —and it has a specific gravity of 2.64.

Sands for polishing must consist wholly of angular grains, which must be of as nearly uniform size as possible, or the surface of the article will be scratched. Highly colored sands are seldom of much use for polishing purposes, though if the color is merely due to stains in the crystals or to material which is readily removed by washing, the sand may be useful. For this reason, before discarding a sand it should be carefully examined under a microscope. By this means, the size and shape of the grains can be seen, and if the microscope has the necessary fittings, the various impurities present can be identified and their proportions determined. If a large proportion of impurities are present, the sand soon becomes useless as the grains of the impurity are usually softer than those of quartz, and wear away rapidly, coating the sharper grains with the material which has worn away and so preventing any further polishing.

If the grains of quartz are large they are useless for polishing purposes, and must be ground. If, however, the sand contains grains of various sizes it may be possible, by

screening, to separate those which are suitable for polishing purposes.

The methods of screening sand are so well known that they need not be described in detail. To be effective the screens should correspond to the sizes of the grains of sand, unless—as sometimes happens—a sand is composed of grains of all sizes, when it will probably suffice to use four screens of 50, 80, 100 and 200 mesh respectively. Such highly mixed sands are not so suitable for polishing as those consisting almost wholly of one size of grain or those from which such a "one-size sand" can be separated.

There are plenty of white sands in the States 90 per cent of the particles of which are of one size; these—after a simple screening—are excellent for polishing so far as that size of sand is concerned. Finer grades must be produced by grinding followed by a further screening. This is often costly if carried out on a small scale as some of the sands used for polishing must be in the form of "flour."

For grinding sand, ball and tube mills are employed. These consist of a revolving drum containing the sand, and a large quatity of steel balls.

As the drum revolves, the balls are lifted and then fall, beating the sand into powder which is then removed and screened or graded. For the finest polishing agents the process of levigation is usually employed. In this, the powder is stirred violently with water, and is then either allowed to settle for a few minutes, after which the turbid liquid is poured off and allowed to settle for a further period, this being continued indefinitely as the various sized particles are collected in various vessels; or the abrasive suspended in water is allowed to flow slowly through a series of tanks, each one in the series being of greater diameter than the preceding one. By this means the rate of flow of the liquid is reduced, and the particles of sand are deposited according to the rate of flow and to their respective sizes. The various residues are collected separately and dried, ready for use.

In some cases the finest particles are separated by a current of air. The sand is passed into a funnel through which a regulated current of air passes. The air carries off the finer particles and the coarses ones settle and pass out through trap doors.

Each grade is useful for a specific purpose and the skill of the salesman lies in finding a market for each, as it would not pay to separate a small proportion of one grade if the others could not be sold.

In order to secure repeat orders the grading must be accurate and constant. Variations in the grade are highly objectionable to polishers and a ready source of loss of sales.

Uses of Sands

Sand is chiefly used for polishing glass, marble and other stones, but owing to the absence of properly graded materials, and the sale of sand of inferior hardness, there is a tendency to replace it by artificial substances, obtained in the manufacture of carborundum. These artificial abrasives are costly and for many purposes are no better than properly graded sand. Their great hardness is sometimes urged as a reason for the rapid rate at which they work, but even this apparent advantage is accompanied by several drawbacks which counterbalance it in many ways.

When selling sand as a polishing agent in competition with other materials it is important to see that the particles of sand are sharply angular. To insure this they should be ground dry and not with water which rounds the edges and makes the grains into miniature pebbles of very low abrasive power and therefore slow in creating

a polish. The necessity of having sharply angular grains is equally great for all purposes for which sand is used as a polishing agent, the different stages of polishing being secured by the size of the particles and not by their shape.

For polishing glass or small blocks of stone rotating or oscillating discs or tables are used. These are charged with sand and water at intervals and the material to be polished is held mechanically in such a position as to be pressed against the wet sand. For some purposes the positions are reversed and the stone or glass fastened to a stationary holder and is polished by an upper moving disc or rubber, the wet sand being between this and the surface to be polished.

To obtain an exceptionally high polish, sand cannot be used alone; it may most suitably be employed for all but the final polishing, which should preferably be effected by rouge or putty powder (tin oxide).

Polishing Metals

Sand of extremely fine grain—usually produced by the dry grinding process, but occasionally by screening very fine natural sands such as the *Kiesel Kriede* of Central Germany—is largely used as the polishing agent in many of the liquids and pastes used for polishing metals. For this purpose the grains must be so small that they rub away the tarnish without leaving any scratches large enough to be visible to the naked eye; under a microscope the tiny scratches are easily visible. Though so minute—they must pass easily through a 200-mesh sieve—the particles must be sharply angular or they will roll over the metal without polishing it.

The other ingredients of the fluid or paste consist wholly of a medium or vehicle to carry the sand and a detergent or cleaning agent—such as paraffin or oxalic acid—which owes its cleaning power to its solvent action. There is no need to give proportions here as they can be found in many books of workshop recipes.

Notwithstanding the smallness of the grains of sand used in polishing metals its action is that of the large grains and is of an abrasive nature, *i.e.*, they remove the projections from the rough surface and fill up any hollow portions in the material to be polished.

Sand Paper and Cloth

Sand is also used in moderately large quantities for sand paper and sandcloth to which it is affixed by strong glue. The sand used for this purpose must be accurately graded and highly angular. For smoothing wood and leather, sand paper is often preferable to harder abrasives such as emery.

Materials Resembling Sand

Many materials having some resemblance to sand are also used for polishing purposes. Some of them occur in close association with sand and might be thrown away by quarry owners who did not realize their value. Among the more important of these are:—Rottenstone, Tripoli powder, Kieselguhr, and several varities of silt.

Rottenstone is a soft siliceous stone of a yellowish-grey or brownish color and a very fine texture. It consists of the siliceous skeletons left behind after the large masses of certain impure limestone rocks have been removed by solution in rain-water containing carbon dioxide. This dissolves only the calcium carbonate and leaves the insoluble siliceous matter behind as a soft stony deposit.

Tripoli powder is also composed of siliceous skeletons and is often nearly white in color. It usually contains about 80 per cent of silica, a small amount of alumina, and up to 8 per cent of iron.

Kieselguhr (infusorial earth) is a whitish powder consisting of the siliceous shells of microscopical plants

and is easily recognized by using the microscope.

Silts are usually too fine and consist of grains which are too rounded to be of much value as polishing agents. A few of them—easily recognized on a microscopic examination—are excellent for the production of rubbing blocks. For this purpose they may be mixed with just sufficient clay to bind the particles together and are then moulded into blocks or briquettes and burned at a dull red heat. The famous bath bricks used in England are of this character and are made of a muddy deposit carried up by the tidal River Parrot at Bridgewater, England, and deposited as mud-banks or slime.

Summary

Among the apparent waste of some sand quarries materials may often be found which are valuable polishing agents. Still more profitable are the grades of sand which can be sold for various polishing purposes. These sources of profit should not be overlooked, as is so often the case; on the contrary their exploitation will sometimes yield a far better return than the ordinary sand plant. Even on a small scale they prove a profitable adjunct to the large plant.

Brownhoist Sales Manager

The Brown Hoisting Machinery Co. of Cleveland announces that their conveyor sales are now in charge of Mr. E. P. Sawhill, who has had nearly 30 years engineering and selling experience on this type of equipment.

The Brownhoist elevator and conveyor equipment includes a complete line of belt conveyors, chain conveyors, coal crushers, screens, apron conveyors, etc.

The Acme Limestone Company has been incorporated at Kansas City, Mo., with a capital of $300,000.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,431,987. Separator-screen. Herbert S. Simpson, Chicago, Ill.

1,432,738. Portable apparatus for elevating and screening coal and other unscreened material. Paul J. Alwart, Chicago, Ill.

1,433,485. Pulverizing mill. Daniel V. Sherban, Canton, Ohio.

1,434,065. Grab-bucket. Ephrem Prefontaine, Buffalo, N. Y.

1,434,600. Screen and other separator. George H. Fraser, Brooklyn, N. Y.

1,434,601. Bucket-cleaner. James C. French, Chicago, Ill., assignor to F. C. Austin Machinery Co., same place.

1,434,691. Screen or separator. George H. Fraser, Brooklyn, N. Y.

1,434,692. Separator or the like. George H. Fraser, Brooklyn, N. Y.

1,434,843. Pulverizing apparatus. Fred I. Raymond, Evanston, Ill., assignor to Raymond Brothers Impact Pulverizer Co., Chicago, Ill.

1,434,937. Excavator. Marion E. Watts, Portland, Ore.

1,435,109. Bucket-trip for steam excavators. David De Santo, New Rochelle, N. Y., assignor to Wilkes-Casey Engineering & Contracting Co., same place.

1,435,137. Mining apparatus. Morris P. Holmes, Claremont, N. H., assignor to Sullivan Machinery Co.

A company, known as the Waldo County Agricultural Lime Co., has been formed at Belfast, Maine, to pulverize and market limestone for farm use. O. W. Ripley of Montville is president, A. L. Young, Lincolnville, vice-president; Allen H. Miller, Lincolnville, secretary; and A. S. Heal, Belfast, treasurer.

The Superior Portland Cement Co., are planning the erection of a $16,000 building at Concrete, Wash., to be used for offices and a laboratory for the company. The contract is signed by the Rounds-Clist Co., general contractors, Tacoma, Wash.

Waste in Boiler Operation

THE high price and scarcity of coal have accentuated the need of knowing and preventing the waste attending the operation of boilers. Too many business men profess that they know little if anything about boilers and their operation, saying they don't wish to know as they leave such details of their engineer or firemen. As a rule the cost of operating a small boiler is at least ten dollars while larger ones can cost forty or fifty dollars per day while batteries of large boilers can cost hundreds of dollars per day to operate.

Many business men have spent much money to eliminate small waste in their office and bookkeeping and also in their other operations, while boilers are neglected, and what may once have been an excellent boiler plant when new has become a very inefficient one.

This is poor business. If steam power is to be used, then the first thing to have absolutely correct and efficient is the boiler plant, and every business man who owns and operates such a plant should know the details of operation. Lacking this information, they should post themselves. It is with the idea of presenting some facts that will lead to and prevent waste of fuel in operation that this article is written.

Unfortunately some of the inherent defects in a boiler setting come from the design and installation. It is only possible to change some of these things by having the boiler reset. This is an expensive job, but in some cases it would more than repay for the money expended.

In looking for wastes, the first consideration is the ash pan. This should be of sufficient depth to give plenty of air to the fire box and hold a reasonable amount of ashes. If the ash pan is not built to give sufficient draft to the grate, then it should be deepened. This can be done by either building the bottom on an incline or else digging a pit in front of the boiler and extending this space back under the ash pan to the bridge wall.

If these things cannot be done, then it will be necessary to install a system of forced draft. Money is wasted in coal consumption by poor ash pans.

Next to the ash pan comes the grate, and it is a strange fact that the grate is the keynote of everything that spells efficiency for a boiler. A grate can partially overcome defects about a boiler. A poorly designed ash pan, a poor stack, a short arch, even defects in the boiler itself, and it is also true that a boiler can be equipped in the best manner possible yet with a poor grate there will still be a great waste of fuel and a poor evaporation of water. It is quite surprising how the efficiency of a boiler can be effected by substituting the best type of grates for those of poorer design.

In one case in the writer's experience with a fairly efficient boiler plant using a battery of these boilers, in spite of the fact that the ash pan was correct, the fire box without leaks, a good stack and the boilers kept clean, the change of grates allowed the owners to save a boiler, for with the new type of grates two boilers did more work than the three had ever done.

In another case where two Scotch boilers were being used one boiler was made to do the work that both had done by simply substituting a better type of grate for those that were in the boilers.

In a third case with a large water tube boiler, the change of a grate meant the saving of more than two tons of coal daily, yet with natural

draft, an overrating of the boiler of 133 per cent was obtained.

The essentials of a good grate are: First, it should be made of such metal and of such weight as not to burn out or become broken. Second, it should give sufficient air through the grate as to give perfect combustion. This means CO_2 combustion instead of CO, and the majority of grates give most CO combustion, unless the slice bar is used continually. Third, the grate must be so constructed as to allow it to clean itself without opening the fire doors and without dumping unburned coal or partially consumed coke into the ash pan to be wasted. Fourth, for anthracite coal the grate must be so designed as to cut off the bottom of the fire bed, getting rid of the consumed coal (ashes) without disturbing the top of the fuel bed.

The size of the grate is of great importance. The area must be sufficient to give enough combustion to obtain the rated horsepower or any over rating or carry an overload on the boiler, but it should not be so large as to burn an excess amount of coal. Thus with some types of grates it is possible to cut the grate area down as much as one-fifth or one-fourth and yet obtain greater water evaporation with a pound of coal than with other types of grates.

This is a fact that engineers and owners frequently overlook in substituting an improved type of grate for older, obsolete types. They seem to think that they must have the same size grate as they have been using, little realizing that they are wasting 20 to 25 per cent of their coal.

The next consideration is the fire-box itself. The dead plate does not play a prominent part in combustion, except that it should not be excessively wide, as many firemen will allow coal to burn on it, nominally wasting that amount. The dead plate, though should be of the indestructible type so as not to cause frequent repairs.

The fire-box should be of the same size as the grate. This means that the grate must come flush with the bridge wall, and the side walls must go up straight from the grate. The height of the fire-box is important. Too many boilers are set too low. One reason for this is that the boiler room roof is built too low, so that there is not sufficient room on top of the boiler for a man to go upon it to work, if the boiler setting is made to the proper height. There should be enough height to the fire-box to allow the gases as they are generated to circulate above the fire bed and become well heated before they are carried back into the back combustion chamber and up among the tubes, also to hold the smoke temporarily while the carbon is being consumed.

The exact dimensions cannot be given as this must depend upon the size and type of boiler. A high fire-box means a little longer time is consumed to get the boiler steaming, but with the steam once started, it is maintained easier with less coal.

Another important factor in this is the bridge wall in the rear of the fire-box. This wall should be of ample height to prevent burning coal from falling over it into the back combustion chamber and to deflect the gases and smoke back over the fire bed, but it should not be so high as to prevent their easy flow into the back combustion chamber, otherwise an excessive amount of heat is thrown against the fire walls and arches, so that heat is lost and these things with the boiler front are quickly burned out.

If the smoke and gases are to be held longer it is advisable to build a brick baffle behind the bridge wall in the back combustion chamber.

(To be continued)

Adopt New Constitution

National Sand and Gravel Association Does Important Work at Chicago Meeting

On November 15, at Chicago, representative sand and gravel producers of the United States, members of the National Association of Sand & Gravel Producers, adopted the new constitution which changes the name to the National Sand & Gravel Association.

Provision is made for the functioning of the organization under the new constitution by a resolution which reads: ". . . changes made in the constitution shall become effective as soon as practicable but not later than the date of the next annual meeting; provided, however, that, until such changes can be carried into effect, the present constitution shall govern."

The high lights of the new document, points in which it differs from the old constitution, are those concerned with the methods of individual and district representation, the payment of dues, and the organization of the administrative machinery of the association.

It was decided that the annual assessment shall be due and payable in 12 equal monthly installments, and shall be computed on the production of the previous year.

The executive committee of the new association may accept as individual members the membership of any state or district association that the executive committee shall recognize as such. In the case of such admission of individual members in a body the local organization shall agree to underwrite the dues of its entire membership, collecting the money from the individual members and paying the same to the national, less a discount of twenty-five per cent.

Associate members are provided for in an amendment to the constitution which reads as follows: "Any individual, firm or corporation not a producer of mineral aggregate but interested in the association may become an associate member without voting privileges upon payment of $50.00 per annum."

It was decided that a special meeting of the association or the board of directors may be called by the president or by five members of the board of directors at any time, after due notice has been given and the purpose of the meeting stated. The president or three members of the executive committee can call special meetings of the executive committee at any time by complying with the same conditions.

The executive committee shall consist of four members of the board of directors chosen by the board from its own number, these four members sitting with the president, vice-president and secretary-treasurer. This executive committee shall actively conduct the affairs of the association.

Before a meeting the organization had prepared a map of the United States which indicated the tentative division of the country into 26 districts. Under the terms of the new constitution each of these districts is entitled to choose one director.

Luncheon on the day that the producers met was provided at the Blue Fountain Room at the La Salle Hotel by Mr. Bradley S. Carr of the American Manganese Steel Company. The meal was greatly enjoyed by Mr. Carr's guests.

Shortly before the meeting adjourned Mr. John Prince presented to ex-President V. O. Johnston a handsome gold watch and chain and a diamond-set knife. The present was a very fitting one, and expressed well the feelings of the association towards Mr. Johnston, who for a number of years has given unsparingly of his time and talents for the advancement of the organization.

After the regular session, the executive committee met to decide upon the time and place of the next annual convention, January 24, 25 and 26, were fixed upon as the dates on which the convention will run. The committee was unable to select a city and will put the question up to the membership. It appears that the choice will be either St. Louis or Washington.

Mr. Ed. C. Wilson, formerly connected with the U. S. Light & Heat Corp. and the Vapor Car Heating Co. with offices at Chicago, has been appointed western sales manager for the Ohio Locomotive Crane Co. of Bucyrus, Ohio, with offices in the Railway Exchange Building, Chicago.

Pick Convention City By Ballot

Vote Being Taken Among Sand and Gravel Producers—Other Washington News

By Our Washington Corrsepondent

Officers of the National Association of Sand and Gravel Producers are anxiously awaiting the membership vote on the question of where the annual convention is to be held in January. At the Chicago meeting recently the 24th, 25th and 26th were selected as the dates, but no decision was reached as to the city. Washington, St. Louis and Des Moines were the three cities presenting claims for the next convention. Consequently, as it was impossible to make a decision at the Chicago meeting, it was decided to take a membership vote. Ballots have been sent out by T. R. Barrows, executive secretary, but not a sufficient number have come in to give any idea as to which city is leading.

Ten thousand miles of Federal-aid highways were completed in the last fiscal year, bringing the total mileage to 19,308, says an announcement just made by the Bureau of Public Roads. The year's work constituted a new record. Texas leads in miles of completed Federal-aid roads with 1,733 miles, while Minnesota is second with 1,416. Texas also is first in mileage under construction with 1,408 miles, and Nebraska is second with 970 miles. Iowa is third with 945 miles. Texas and New York receive the largest allotments of Federal aid, which is distributed on the basis of population and mileage of State highways.

Aside from the Federal-State highway work the bureau of roads has completed 1,352 miles of road in the national forests, and there are under construction 617 miles, the whole to open up regions of great natural beauty. Based on available data, bureau officers state, the sum to be spent this year on highways will total $742,000,000. The figure includes Federal-aid roads and projects built in addition by the States and smaller municipal units without the aid of Federal funds. More than 30 miles of bridges have been built under the Federal-aid highway program since 1916. One of the largest of these bridges, that from Mandan to Bismarck, N. D. is more than 3½ miles long and cost $1,428,000.

Highway building over the country is to be given additional impetus, as the result of assistance offered by the Federal government. The bureau of public roads has addressed a memorandum to the highway departments of all the State governments offering them thousands of tons of explosives which were left over from the war. Picric acid is being distributed in large quantities and road builders and highway engineers are urged to write to Washington to obtain allotments of the explosives, for use both in construction and maintenance.

The federal appropriation, to aid road building, which expires June 30, 1923, amounts to $50,000,000, less 2.5 per cent which will be deducted for administration expenses. This leaves a balance of $48,750,000 which has been alloted the states on a population basis, as is always done in the case of state aid.

There has also been authorized, but not appropriated, $65,000,000 additional for the fisal year beginning July 1, 1923. However, it is expected that when this authorization comes before the budget committee it will be trimmed down, but to what extent no one feels at liberty to say at this time. In any case, it is felt that at least $50,000,000 will be again distributed as federal-aid in road building.

The department announces that reports made to the Bureau of the Census show a considerable increase in the activities of the establishments engaged primarily in the manufacture of cement during the year 1921 as compared with 1919. The total value of products reported amounted to $203,627,000 in 1921 and to $175,265,000 in 1919, an increase of 16.2 per cent. The increase in production was accompanied by increases in the number of persons employed, in the total amount paid during the year for salaries and wages, and principally in the cost of materials used. Of the 125 establishments reporting in 1921, twenty-one were located in Pennsylvania; twelve in New York; eleven in Michigan; nine in California; eight in Kansas; six in Ohio; five each in Illinois, Indiana, Missouri, and Texas; four each in Alabama, Iowa, Utah, and Washington; three in Minnesota; two in Colorado, Maryland, Montana, New Jersey, Oklahoma, Oregon, and Tennessee; and

one each in Georgia, Kentucky, Nebraska, Virginia, and West Virginia. Pennsylvania, the leading state in the industry in 1921, produced 26.8 per cent of the total value of products in that year. The returns indicate that the combined output of fall establishments was approximately 66 per cent of the maximum capacity, based upon a demand requiring full running time.

Budget In Business

It Can Be Made a Living Thing, Not Merely Red Tape, Says McCullough

Much has been written recently on the mechanics and machinery of the budget in private enterprise, but little has been said about the spirit behind the budget.

"It is this spirit behind the budget," says E. W. McCullough, manager of the Fabricated Production Department of the Chamber of Commerce of the United States, "which, in the last analysis, will determine whether the forms and procedure of budgetary control shall mean but another addition to the administrative red tape now cluttering business."

Mr. McCullough deals with this phase of the subject in a bulletin which his department has just issued under the title, "Budgeting for Business Control."

"The first point in a reasonable financial program," says Mr. McCullough, "is to aim for that amount of business within one's resources to handle which will give a fair return and which is founded upon a conservative view of the real demands of the consumer.

"The second is to strive to make the most of capital resources; establishing a production system; by refraining from plunging into expenditure for new plants and equipment where the old will serve the purpose; by placing collections on a reasonably prompt basis; by having purchases in line with production and sales programs and by refusing to act as a free warehouseman.

"The third is to regulate current borrowings in such a way that they will be well under control. As the business of a firm expands, the gap between the order and payment date increases, bringing with it a growing need for banking accommodations. These banking requirements are usually granted, for the increase of business is a warrant of the success of the enterprise. New loans are made and old ones are renewed, and extended, until almost insidiously grows the conviction on the part of the manufacturer that the short term accommodations are fixed contribution to the capital of his business, and he acts and works upon this assumption. Inevitably, the day comes when the bank finds itself pressed for funds and, in turn, calls on the manufacturer for payment, and since such a demand usually comes at a time of business depression, the manufacturer finds himself unable to liquidate. Then very likely reorganization ensues, resulting at best in the short term funds becoming, upon onerous terms, a part of the funded or long term obligations.

"For all lines, seasonal and non-seasonal, it should be clearly realized that short time obligations are not a permanent contribution to capital and that manufacturers should hold themselves in readiness to liquidate when required, by at least maintaining a comfortable margin of cash and liquid accounts receivable over current indebtedness. Short term obligations should bear a definite relationship to the capital, or rather to those assets which are properly coverable by short term borrowing, and any unwarranted increase in this ratio should be regarded with alarm. The liquidation of debt ought to go hand in hand with the liquidation of inventories or accounts receivable and it is a danger signal if a given debt should carry beyond the liquidation of the inventory or other transactions for which it was incurred. The practice of some bankers of requiring a sixty to ninety day liquidation from non-seasonal as well as seasonal lines is a conservative influence and has a salutary effect, even though this requirement may mean only a rotation of loans among other banks."

Walter S. McKee has resigned as vice-president and director of the American Manganese Steel Company and will develop the business of the Inland Engineering Company of Chicago, of which he is president.

The convention and exhibit of the American Road Builders' Association will be held in Chicago January 15 to 19 inclusive.

Eastern Trade Notes

Market and Other News of the Pit and Quarry Industries in Several States

By Our Eastern Correspondent

As the winter season advances, sales are growing more restricted in the line of sand, gravel and crushed stone in the New York district, and even more so than would ordinarily be the case on account of the growing shortage of a number of basic building commodities. The scarcity has extended to the point of holding up current construction activities in different instances, and the necessary immediate relief is the outstanding feature in the local market.

Portland cement, an item of particular concern, continues to be available in desired quantities, but this encouraging condition is only momentary, and brought about by freight embargoes on building materials on New England railroads, primarily the New York, New Haven & Hartford Railroad, with consequent diverting to the New York district all cement shipments consigned to New England points.

A bright spot in the situation is the marked price stability now prevailing. Sand, gravel and affiliated products are holding well at established levels, despite decreased demand and increased supply. The availability of local sources of supply for these commodities also finds the industry in good condition for the closed months of the year, and as a whole, sales and distribution are expected to exceed those of 1921-22. Production in the Long Island producing sections is being controlled according to the demand, while sand and gravel plants in New Jersey and neighboring parts are keeping at it with good-sized working forces. The labor situation is fair, although in certain districts, such as the Raritan River section of New Jersey, there is a marked scarcity of men and accordant premium of higher wages for those who will work.

High grade washed gravel shows an advance of from $1.75 to $2.00 a cubic yard in cargo lots at New York, both for ¾ and 1½-inch stock. This establishes the same level as prevailed here last winter, and producers say will hold for a number of months to come. Supply dealers are asking $2.75 and $3.00 for the material delivered on the job.

First quality washed sand shows no change from the prevailing $1.00 a cubic yard price, wholesale, to contractors and dealers. An advance, however, to a slightly higher level, or around $1.25, would not be entirely unexpected. Retail supply yards continue to quote at $2.00 a cubic yard, for Manhattan and Bronx deliveries. Fine white sand is being sold at $4.50 a yard, delivered on the job.

Crushed stone prevails at a $1.65 level for 1½-in. stock, cargo lots f. o. b. city, with smaller material, ¾-in., priced at $1.75. These figures are from 10 to 25 cents a cubic yard below those of this same time a year ago. Local supply yards are turning the material at a flat rate of $4.00 a cubic yard, both sizes, delivered on the job.

Portland cement, with its ups and downs, has re-established a $3.20 per barrel rate in the New York district, after an advance to $3.25 for October and early in November. The bag rebate of 10 cents holds as heretofore, but with much keener disposition on the part of the producers to secure all bags possible for immediate refilling. In the wholesale market, dealers and contractors are paying $2.30 a barrel for material alongside dock, and $2.60 for delivered wholesale stock, less bags. A month ago, these figures were $2.55 to $2.75.

Lime is showing a tendency to reach and stay at higher levels, and the past month shows changes in quotations. Hydrated finishing material has increased to $17 and $17.50 a ton at the warehouse, wholesale, with common hydrate stock holding at $13.00 and $13.10. Hydrate finishing stock in paper bags is being sold by dealers at $24.00 a ton, and common hydrate, similarly packed, at $19.50 per ton, delivered. Lump lime, common, is priced at $2.75 and $3.10 per barrel at the warehouse, and finishing stock, at $3.60 to $3.65, wholesale. The latter, in 300-pound barrel is being retailed at $4.50 at the dealer's yards, delivered to job, and common lump lime, same size container, at $3.75. Wall plaster shows no change from previous levels.

The Norton Stone & Lime Corporation, Cobleskill, N. Y., has been formed under state laws with a capital of

$500,000, to operate lime properties, stone quarries, etc. The company is headed by A. L. Norton, Cobleskill.

The Phoenix Stone Co., New York, has been incorporated under state laws with a capital of $50,000, to operate stone quarries. The company is headed by T. F. Conlon, R. W. Owens, Jr., and J. J. McGinty. It is represented by Van Doren, Conklin, McNevin & McClenthen, 31 Nassau Street, New York.

The Palmer Concrete Products, Peabody, Mass., is arranging for heavy production at its Mansfield gravel pit. A plant is being established for the manufacture of a line of concrete building products, blocks, etc.

The Imperial Granite Co., Quincy, Mass., has been organized under state laws with a capital of $20,000, to operate a local plant. S. W. Giarrusso is president; and Adolph J. Restelli, treasurer, Quincy. The last noted represents the company.

The production of sand and gravel in New Jersey continues to show a marked increase from year to year, and the official figures of the 1921 output, just compiled by the State Department of Conservation and Development, Trenton, are of more than ordinary interest. The production of stone in the year noted reached a total of 684,207 short tons, valued at $2,653,008; this is an increase of 4,487 tons over the output of the preceding year. Trap rock showed an increase of 125,230 tons over the production for the previous year, while other stone, such as granite, slate, sandstone, etc., aggregated 113,567 tons output in 1921, or more than 12,000 tons over the figures of the preceding twelve months.

All of the slate quarries in the vicinity of Wind Gap, Pa., are in active production, giving employment to a full working force on full time basis. A number of the quarries have adopted an overtime schedule. Heavy orders for material have been received and it is expected to continue on the present schedule for a number of weeks to come. A number of new slate mills are being projected in this district, among these being a particularly large plant for A. F. Teel, Wind Gap. Plans are in progress for the mill.

The American Lime & Stone Co., Bellefonte, Pa., has foundations under way for the construction of a new three-story building at its plant, about 36x50 feet, to be used for operating and office service.

The State Highway Department, Harrisburg, Pa., is maintaining active production at its quarry at Atglen, near Coatesville, Pa. There is a heavy call for material for road work, and a large working force is being employed.

Limestone quarries at Avondale, near Coatesville, Pa., are preparing to resume operations at an early date, following a considerable period of inactivity. Working forces are now being secured, and dit is expected that more than 300 men will be employed.

The Cambria Steel Co., Johnstown, Pa., is perfecting plans for improvements at its limestone quarries at Naginey, Pa., to include three additional storage structures and equipment. Five steam shovels will be installed to replace the present hand-digging system, and the working force will be increased to 200 men. It is expected to develop an output of from 25 to 30 carloads of graded limestone per day for use at the steel mills at Johnstown. A number of new dwellings will be built in the vicinity of the plant for the additional employes.

The H. L. Cannady Co., Wilmington, Del., has been organized under state laws with a capital of $100,000 to operate stone quarries. The company is represented by the Corporation Trust of America, du Pont Building, Wilmington.

New Link-Belt Catalog

A new Link-Belt portable loader catalog has just been issued by the Link-Belt Company, Nicetown, Philadelphia, Pa., embracing their entire line of portable equipment. Copies can be obtained by addressing the manufacturers.

It is 8½x11 in size and contains complete specifications of all of the standard machines which include the large one-man power Swiveling loader, the portable belt conveyor, the standard type "A" machine for anthracite coal, the "CS" loader for handling sand and gravel, in fact it is the most complete book of its kind ever issued by the company.

No Cold to Hinder Work

Texas Has Not Yet Felt Any Seasonal Decline

By Our Dallas Correspondent

A more optimistic tone prevails in the sand, gravel and crushed stone business in Texas, although scarcity of railroad cars still proves a great drawback. So far there has been little or no decline in building, and road construction and street paving work is going forward with redoubled activity. The seasonal decline in building operations in this part of the South is not great, and so far there has been no cold weather to hinder operations at all.

Prices are holding steady, although there is a slight weakening. Were it not for the scarcity of railroad cars and the slowness of deliveries it is believed that prices would show a drop, but the pressing demand for these materials is made more pressing by the difficulties in getting deliveries, and prices are holding up well.

Several Dallas and Fort Worth firms were badly hit by the Government priorities order, but so far there has been a marked ability to weather the storm and all companies doing business in this section will come out on top. The J. Fred Smith Gravel Company of Dallas, Clem Gravel Company of Dallas, Trinity Sand and Gravel Company of Fort Worth and Dallas, and Vilbig Bros. all suffered loss in business through the priorities order, for these companies either depend altogether or in large part on the railroad companies in making deliveries.

Work on Dallas county roads now under construction in completion of the highway building program entered upon two years ago when the county voted a bond issue of $6,500,000 for good roads was slowed up on account of a shortage of sand and gravel, but this work is now going forward with renewed activity. The county operates a fleet of Government motor trucks and does much of its own hauling, but the sand, gravel and other materials are usually shipped by rail to some point near the construction work, and are hauled by motor truck from the railroad switch to the workmen on the road. In this way the haulage is reduced and better speed is made on the various jobs, to say nothing of the reduction in cost of the work.

The county is now building what is to be known as the Belt Highway, a graveled road entirely encircling the city of Dallas near the borders of the county, and connecting all the cardinal roads that radiate from the city as the spokes of a wheel from the hub. Most of the cardinal roads are of concrete construction, and they are practically finished now, or contracts well advanced.

Contracts for the construction of the Lancaster Pike, extending from Dallas to the county line at Lancaster, south of Dallas, a distance of 14½ miles, have recently been awarded by the County Commissioners of Dallas county. Contract for the crushed stone and macadam base was awarded to Fuller & Co. of Dallas, for $221,741.08. The county in addition will furnish 31,300 cubic yards of crushed stone and 40,000 cubic yards of native stone, at an estimated cost of $94,000. Contract for the surfacing of 1½ inches of asphaltic binder course topped with 1-inch sheet asphalt was awarded to Wear & Thomas of Dallas for $200,364.06. This will bring the total cost of construction of the 14½ miles of roadway to $516,105.14. Contractors have begun work and the contracts call for completion of the job by Jan. 1, 1923.

The city of Dallas is also going forward with its street paving program, and contracts aggregating more than $250,000 have recently been awarded.

The city of Houston last week awarded contracts for graveling more than one mile of streets. The property owners pay for the gravel while the city pays for the cost of putting it on the streets.

Highway construction work in Tarrant county has been slowed up by failure of contractors to get gravel on account of the car shortage, and highway construction work and street paving in several Texas cities has been materially curtailed.

The County Commissioners' Court of Tarrant county have ordered bids for grading and surfacing with gravel 10.31 miles of the Arlington-Mansfield Road. It is estimated that between 50,000 and 60,000 cubic yards of gravel will be employed. The County Commissioners of Henderson County last week contracted to purchase 10,000 cubic yards of gravel from J. L. Whorton of Navarro county for use in high-

way building. The gravel was sold in the pit at 50c per cubic yard, and the county took an option to purchase 10,000 cubic yards more at the same figure.

The Gaudalupe River Navigation Company of Victoria, Texas, has moved its gravel pit and all loading equipment, including steam shovels and drag lines, to a new location about 1½ miles distant. The move was made necessary by exhaustion of the gravel supply in the old location. New loading equipment will be placed with a capacity of 20 cars a day, which will be enlarged as needed, it is announced.

D. M. Picton & Co. has contracted to furnish 8,000 tons of crushed stone for Federal Government work at Port Arkansas, Texas, to be used in extending spurs, repairing jetties and the St. Joseph Island dyke. The rock will be brought from Picton & Company's quarries at Beckmann, Texas.

A. O. Neumann, proprietor of the Gonzales Cement Works at Gonzales, Texas, announces that he will build a new plant to be located near the Southern Pacific Railway station, on what is known as the old Schleyer homestead. The main building will be 50x88 feet, two stories high. Another building 40x50 feet will be built. The plant will manufacture cement, fancy tiling for floors, hearths, mantels, etc., and face brick of various colors and textures.

The Brackettville Rock Quarry, owned by the Government, near Brackettville, Texas, has been reopened after a period of idleness covering a period of several years.

"Pennsylvania" Armorframe Single Roll Coal Crusher

The latest development of the single-roll crusher, which marks a fundamental improvement in design, provides a frame fabricated from slab steel plates into an unbreakable unit, and is the product of the Pennsylvania Crusher Company, Philadelphia.

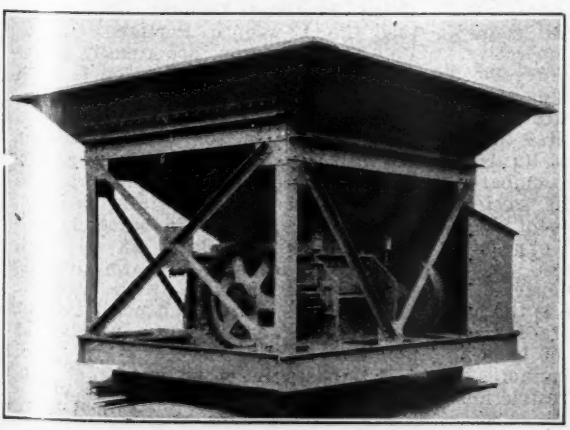
In the 18x18 inches and 18x24 inch sizes, in which this design is now available, the steel side plate are 1 inch in thickness, and are connected by nine steel cross members all heavily hot riveted into this rigid box frame.

Bronze bushed bearings are shouldered into the heavy side plates so that the bearing bolts are not subjected to shear.

The heavy flywheel pulley which drives the roll through heavy cut back gearing, is provided with a shear pin safety device, mounting a steel bolt in hardened bushings, thereby insuring full protection of the crusher parts against the accidental introduction of tramp iron with coal.

The breaker plate is a massive casting of high-grade charcoal iron deeply chilled on the crushing surface. It is hinged in the frame at the upper end and suspended at the lower end by means of powerful relief springs. The breaker plate tip which takes most of the wear, is a reversible and renewable manganese steel casting.

The segmental roll is cast from high-grade charcoal iron, deeply chilled, or from chrome steel.



The crusher proportions are unusually liberal throughout, and the design insures a continuous supply of uniformly crushed coal by affording the three safeguards, — unbreakable steel frame, steel shear pin safety device and powerful relief springs—as protection against the heavy tramp iron encountered in R. O. M. bituminous coal which often has proven destructive to crushing machinery.

Cement Mill News

Items of Interest From the Important Producing Districts

Cement mills in the Lehigh Valley section of Pennsylvania are maintaining operations at a maximum point. There is no let-up, nor any indications of let-up in sight, and it is likely that curtailments for a number of weeks to come will occur only through absolute necessity for equipment repairs or other essential plant work. Orders on hand are sufficient to give the greatest encouragement to the situation, neglecting the incoming orders that are piling up and making reserves a remote thought. There is no opportunity whatever to accumulate any stock for storage and comply with current demand, and as a consequence, storage bins continue empty.

The labor situation has righted itself to an appreciable extent, and sufficient working forces are more pronounced. There has been no change in the wage scales during the past fortnight, and this question, with the recent increase, seems to be settled for the time being.

The movement of stock to destinations is still the critical factor to be considered. While freight embargoes on cement and other building materials are gradually being discontinued, the shortage of cars and locomotives brings about a condition equally as bad. Mills are falling far short of their requirements in this direction, and there is no indication of any immediate relief. Fleets of motor trucks are now being pressed into service for haulage to reasonably near points of delivery, or to rail connections where no embargo is operative.

The latter plan is being developed quite intensively at Catasauqua, to which point motor trucks are operating from the mills. Here it is being loaded on cars of the Central Railroad of New Jersey, which has no embargo, and moved to eastern and western points. Many tons of cement have been handled in this way, expensive as it is, during recent weeks.

Another matter of considerable importance at the present time is the bag shortage. The freight embargoes have made for an accumulation of bags at different points which cannot be moved by rail until the restrictions are modified. Consequently at New York, different points in New England and New Jersey, and at other locations, dealers' warehouses are being glutted with the empties, while the mills are in extreme need and cannot secure the bags. Efforts are being made to relieve the situation.

All mills in the vicinity of Coplay, Pa., are continuing at maximum capacity, not only in the production of cement, but in the line of raw material for continuous operation. These include the plants of the Lehigh Portland Cement Co., at West Coplay; the Coplay Cement Mfg. Co.; the Atlas Portland Cement Co.; and others. The amount of rock being accumulated indicates manufacture practically throughout the winter.

A distinct improvement has been made in blasting work n the district just referred to, and a new plan is now operative. The holes for the dynamite are being drilled about 10 feet apart, instead of about twice this distance as heretofore from the face of the quarry. Although more dynamite is necessary to loosen a given amount of rock, it is blasted into finer parts, thus eliminating the need for further blasting after the rock has fallen to the bottom of the quarry.

The Atlas Portland Cement Co., is maintaining heavy production at its large mills at Northhampton, and all other plants of the company in the Lehigh Valley section are on the active list. Similarly, the Lehigh Portland Cement, Co. mills at Allentown, New Castle, Ormrod and vicinity are running full under maximum output. Other large producers, such as the Alpha Portland Cement Co., Easton; the Nazareth Cement Co., Nazareth; the Giant Portland Cement Co., Egypt; and the Lawrence Portland Cement Co., Northhampton, are equally active on full turn, and there is no thought of curtailment.

With a plentiful supply of coal and improvement in the labor situation, the mill base in the Lehigh Valley section has receded to a more practical point in accord with winter demand. The advance to $2.25 a barrel in carload lots, without bags, as set forth in the last issue of PIT AND QUARRY, has been supplanted with a basic figure of $2.10, at which point cement is likely to remain for a number of months.

Mill bases in other important producing districts have also declined for

the reasons noted, and present figures give a more equitable retail price to encourage consumption through the cold weather. At Hudson, N. Y., there has been a decline from $2.35 to $2.20, with a like condition prevailing at Fordwick, Va. Mills at Mason City, Ia., have dropped the figure to $2.05 from a former base of $2.35, temporarily established; the same quotations are current at La Salle, Ind., and Mitchell, Ind. The Universal Portland Cement Co., Universal, Pa., is asking $2.00, while mills at Hannibal, Mo., are quoting $2,10, and at Leeds, Ala., $2.20. Buffington, Ind., and Steelton, Minn., continue with a $1.95 base.

The Lehigh Portland Cement Co., Allentown, Pa., has awarded a contract to Dwight P. Robinson & Co., Inc., 125 East Forty-sixth Street, New York, for the erection of its proposed new cement mill at Tarrant City, near Birmingham, Ala., referred to in the last issue of PIT AND QUARRY, and actual construction has been commenced. The plant will be equipped for a maximum production of 1,000,000 barrels of cement per year and will cost close to $2,500,000. Work will be pushed on the erection and it is expected to have the mill ready for initial service early in the fall of 1923.

The new mill of the Lehigh Portland Cement Co., referred to above, will make the fourth such plant in the Birmingham district, and the fifth cement mill in the neighboring section. These include the plant of the Atlas Portland Cement Co., at Leeds, with an annual rated output of 1,000,000 barrels; the National Cement Co., at Ragland, with a production of 750,000 barrels per year; the mills of the Southern Cement Co., at North Birmingham, with rated production of 150,000 barrels yearly; and the plant of the Gulf States Portland Cement Co. at Demopolis, manufacturing at the rate of 300,000 barrels per year. This makes a gross production of 2,200,000 barrels per year for this section, exclusive of the new Lehigh mill, as well as the plant of the Phoenix Portland Cement Co., also now under construction and which mills will practically double this rated output.

All of the mills in the Birmingham district are now running at full capacity, and have orders on hand for a number of months to come. The labor situation holds up well and practically all of the men required are available. The bulk of production is finding its way into new buildings throughout the southern territory, and the demand from this source indicates no let up now in sight. The Gulf States Portland Cement Co. has plans under way for the construction of additions to its plant to double, approximately, the present output, which is now running on an average of 1,200 barrels per day.

Plans are under way for a new cement mill at Zawiercie, Poland, with equipment to be of American manufacture. The Philadelphia Commercial Museum, Foreign Trade Bureau, Thirty-fourth Street, Philadelphia, Pa., has received an inquiry regarding the projected plant, asking for information pertaining to necessary equipment, and will give preference to modern apparatus. The company sets forth that it is now operating a plant with two rotating furnaces, and will construct a new unit with capacity of about 40,000 metric tons per year. The installation will comprise a rotating furnace of this size, with cooling apparatus and other auxiliary equipment. The Bureau will give full information to those interested upon request.

The Superior Portland Cement Co., Concrete, Wash., has commenced the construction of a new addition to its plant for increased production. It will consist of a main one-story building, 125x250 feet, estimated to cost approximately $100,000. It is planned to place the unit in service immediately upon completion. The general building contract has been let to the Rounds-Clist Co., Seattle, Wash. The company is running under goods production at its plant with heavy call for output, and will continue at maximum for an indefinite period.

American cement producers, and particularly those engaged in export activities, are expressing considerable interest in the aggressiveness of cement mills in Belgium and Germany, which are making all sorts of inducements to secure business, and reducing prices to a low point. The propaganda now under way has worked to the detriment of a number of the French cement plants, particularly those at Boulogne-sur-Mer, which are the largest in this country, with annual capacity of 600,000 tons per annum, or about three-fifths of the gross French production.

Stocking For Winter

Prospective Demand Will Make This No Small Job

By Our Louisville Correspondent

The end of the busy season in carlot shipping draws near at this writing and the sand people here will center quite a lot of their attention now on stocking their yards for winter. It will take busy hustling with their river equipment too because the demand has been fairly lively this fall and this has held stocks down some. And this together with prospective demand through the winter will make necessary unusual efforts to stock supplies enough to run through winter.

Usually winter sand and gravel digging continues till cold weather interferes and hope is expressed this year that they may work up till the end of the year and at least till the middle of December.

The building boom in Louisville has helped out considerably this year, and the best of it is there are many new projects being planned and started even now at the end of the season. One recent estimate shows at least ten million dollars in large undertakings ranging from half a million to three and a half million dollars each now under way and being planned. Among them is a million dollar river terminal, a new hotel building and a number of buildings which will call for an unusual quantity of sand and gravel, so it looks like busy days all through the winter.

Low water in the river practically tied up all river transportation the latter part of September and the first half of October but the sand and gravel people managed to keep at work and lately there have been rails that have brought a more normal stage to the river.

During the second week of October the Kentucky Road Engineers held an interesting meeting at Ashland, Ky., and there was a delegation of about ten from Louisville went to the meeting, among them being J. E. Lloyd, manager of the Louisville yard of the E. T. Slider Co., Mr. Lloyd said it was a good convention, well attended and full of business.

Speaking of trade conditions with the E. T. Slider Co., Mr. Lloyd says that they have not been troubled much lately in getting cars, perhaps partly because the carlot trade is now approaching the end of the season and is not so brisk. The season as a whole has been good in the carlot trade but perhaps even more active in the local trade. In fact, they have had enough doing that they will have to hustle from now till cold weather with their river equipment to get enough stock to carry through the winter.

The Ohio River Sand Co., which was among the exhibitors at the Kentucky State Fair recently, was also among the exhibitors at the Better Homes Exposition at the Armory in Louisville the week of October 23 to 28.

The cement mills and brick plants of this section are now being relieved from the coal stress which interfered with operations for a while as plenty of coal is now available and coal prices are easing down to something more like normal. This helps some, too, in relieving the general car situation so that whole there is still complaint of car shortage and slow transportation it is not as bad as some would have us believe and there is promise that the stress in transportation will be passed before midwinter.

R. B. Tyler, who recently secured a contract for 15 miles of roadway from Camp Knox to Elizabethown, intends to equip three new crusher plants to furnish crushed stone for the job. He will put one at each end of the road section and one at mid-way so as to minimize the truckage. He says he is busy with other quarries and road contracts and expects to keep going as long as the weather permits and is hoping for an open winter so that the work can go right along. Reports from out in the state, he says, indicate that quarries supplying rail material are operating right along and getting cars enough to keep reasonably busy. It has been a poor year for commercial quarry work but a very good year for railway material and road building.

The Owen Bucket Company, Cleveland, Ohio, has just issued a little folder on the Type "J" bucket, describing and illustrating this bucket completely, and showing also, eight reasons why it costs less to operate, is more durable and insures a bigger day's work. This folder will be sent by the company upon application.

Pittsburgh News Notes

Activity is Carrying Well Into The Late Season

By Our Pittsburgh Correspondent

Good activity prevails in the sand and gravel markets at Pittsburgh, Pa., and in addition, there is plenty of dredging work going the rounds to enhance the operations of a number of the prominent sand-digging companies. There is good distribution at the Pittsburgh landings for contractor and dealer accounts, and a large tonnage has been absorbed during the past month. The clear, open weather is helping the situation and there is no immediate thought at anything more than regular seasonal curtailment.

Washed gravel shows no change in price in the Pittsburgh market. The material, f. o. b. float is selling at $1.60 a yard; delivered on the dock, it is $2.00, while for distant hauls, the figure ranges to $3.00, according to distance. Crushed stone is selling wholesale for $2.85 a cubic yard, in cargo lots, both ¾ and 1½-inch stock, while supply dealers price the material at $4.00 upwards. River sand is around $1.35 a yard, wholesale, with retailers asking from $2.35 to $2.50 for delivery on the job.

The Iron City Sand Co., is working on the upper Allegheny River with its digger, and using its towboat "Iron City," for hauling sizable quantities of material to the Pittsburgh landing. The towboat, "P. M. Pfeil," is also busy with heavy barge loads of sand and gravel for local distribution.

The Rodgers Sand Co., is keeping its three towboats, "Margaret," "Sweet-Cake" and "Twilight," in active service on the river, both for sand and gravel distribution and handling of empties. A heavy wholesale account has prevailed throughout the month, with deliveries to Clairton, Ambridge, Parnassus and other points on the river. The sand diggers are busy in the vicinity of Cheswick and the bulk of supply is coming from this point; the towboat, "Twilight" has been running to Fourteen-Mile Island for tows of sand and gravel. A number of repairs have been made to the boats, including boiler work on the "Margaret."

The J. K. Davison Co., will place a new hull on its towboat, "Bronx," which was damaged by fire recently; the machinery was only slightly damaged and this will be repaired. While the vessel is idle, the company will use its sand dredger, "J. K. Davison," as a tow boat. The company is operating under an active call with good distribution.

The Keystone Sand & Gravel Co., is continuing production in the Neville Island district, and the towboat "Victory," is bringing many loaded barges from this point.

The sand digger "Catherine," of the Ohio River Sand Co., has recently been inspected, and the boat will be continued in active service. The Marine Mfg. & Supply Co., is making a number of repairs to the sand digger "Wabash," at its local plant.

Cadillac Portable Electric Blower

A handy device for the plant where grit accumulates is the Cadillac portable electric blower. This device effectively removes grit, dust and dirt from all types of machinery, such as motors, generators, switchboards, and

other power plant equipment which may be kept clean in no other way.

The blower weighs but six pounds, has a ½-inch nozzle outlet, and blows about 20 cubic feet of free air per minutes with a motor speed of 11,500.

This blower has a wide range of usefulness and does the work of elaborate and expensive vacuum and other cleaning systems. Even though compressed air is available, there are places where it is not practical to use it owing to inaccessibility. The Cadillac, being electrical, may be operated when the plant itself is not in operation, for it is only necessary to connect the blower to an ordinary lamp socket to bring it into action.

The Cadillac electric blower is manufactured and sold by The Clements Mfg. Co., 614 Fulton St., Chicago, Ill.

News From Cincinnati

Donnelly, Hall, and Others, Give Their Views on the Present Situation

By Our Cincinnati Correspondent

Material prices continue to hold firm with a demand almost commensurate with the supply. Prevailing weather conditions have given ample opportunity for stone quarries and sand producers to continue operations, and it is predicted that a sufficient storage of these materials will be available for the early spring demand. Local river sand operations have received encouragement from the easy access and economical performance, due to the low stage of the Ohio River. Little rain for the past two months has fallen in the Ohio Valley, and all river activities have profited thereby. Prices are of a well established level, the quotation for sand being $1.15 per ton f. o. b. cars, gravel, $1.40 per ton, and cement ranges a little over $3.00 per barrel. There is a smaller demand for lime, and the ready supply of this material from closeby Ohio producers has made a price of $11.50 a ton for mason's lime, and close to $15.00 per ton for finished lime.

The market in this district is not without its misgivings, and considerable disquietude amongst operators and dealers is evident. The railroad situation in some cases has caused downright consternation, and has caused no end of interruptions and serious delays in the industry. Priority orders and railroad embargoes have left business in a state of uncertainty, with the future conditions portending a bad railroad condition of some duration. The importance of the railroad is so stressed by Harry Donnelly, president of the Ohio Gravel Ballast Company, and a past head of the National Association of Sand and Gravel Producers, that he declares that, "the future of the sand and gravel industry is dependent upon the early clearing of the railroad difficulties." Mr. Donnelly is in close touch with Washington endeavoring to find out how soon the situation will improve, but says that definite predictions as to the industry are impossible, and that no one is in a position to foretell just what the immediate outcome will be. Mr. Donnelly's Company has felt the effect of the small demand for ballast from the railroads, and the company's operations have been temporarily reduced to half.

J. E. McCracken of The J. E. McCracken Supply Co. plainly tells of the detrimental effects of the railroad car situation. Mr. McCracken announces that the coal priorities and other priorities have left little or no available cars for disposition to the basic products transportation. He explains that much material must be stored, because of the deficiency of cars to carry the material from the river banks and from the pits. As a consequence of the insufficiency of transportation facilities, dealers are suffering according to Mr. McCracken, and are unable to procure large amounts of material at any one time. The Moores-Coney Company and other large dealers are effected likewise.

The Cincinnati Quarries Company and the Red Bank Gravel Company and other producers have been given a setback due to the failure of the local increased tax levy to carry by a majority vote at the November election. Little or no street construction or repairs have been made for a number of years, and a more strict retrenchment policy, including the foregoing of all street work, will be necessary for the coming year.

It is evident that the extensive building boom has greatly contributed to offset other unfavorable conditions, and any prevalent dismay is only temporary, and building construction has after all reposed much confidence in the future stability of the basic material market. This is the feeling of Fred Tapmiller of The H. Weber Company, who reports a good demand with a fairly optimistic future.

Fred E. Hall, president of the Ohio Sand and Gravel Association, has a word of encouragement for the producers of sand, gravel, cement and lime and having come from a meeting in Chicago recently, he believes that all pit and quarry operators may expect an outlook which bids fair to equal or exceed the business done since the termination of the war. Mr. Hall is preparing to attend a conference at Columbus, Ohio, to discuss a rate hearing on sand and gravel on December 14th. The Ohio association will endeavor to combat any effort of the railroads to increase the rate on all basic materials.

Steel Conveyor Belts

The flexible steel conveyor belt known on the market as the Sandvik belt, which has been extensively used in Europe in the past, and is now being used in this country, is manufactured by the Sandvik Steel Works, Sandviken, Sweden.

It is made of the very best Swedish charcoal steel, cold rolled, hardened and tempered—hence, has a hard, smooth and dense surface. It comes in straight strips as long as 350 feet, and only .04-inch thick, with rounded and smooth edges, in different widths, weighing from one to two pounds per running foot. It is so flexible that a 16-inch belt 350 feet in length can be rolled into a compact coil and packed for shipment in a box only 2 feet square.

At present the widest belt manufactured, and the one in most general use, is a 16-inch belt. The steel belt is, however, rigid, and while a rubber or textile belt cannot be loaded out to the edges because vibrations would cause spillage, almost the entire width of the steel belt can be used, and in this way a 16-inch steel belt can carry about the same load as a 16-inch troughed rubber belt.

Of course, the rigidity of the steel belt prevents troughing. However, when handling non-abrasive materials a trough can be used—built narrower than the belt and clearing it, or the belt can be run in the bottom of a trough with ample clearance between the edges of the belt and sides of the trough, to take the place of the usual troughed rubber or balata belt, and thus a greater capacity is obtained.

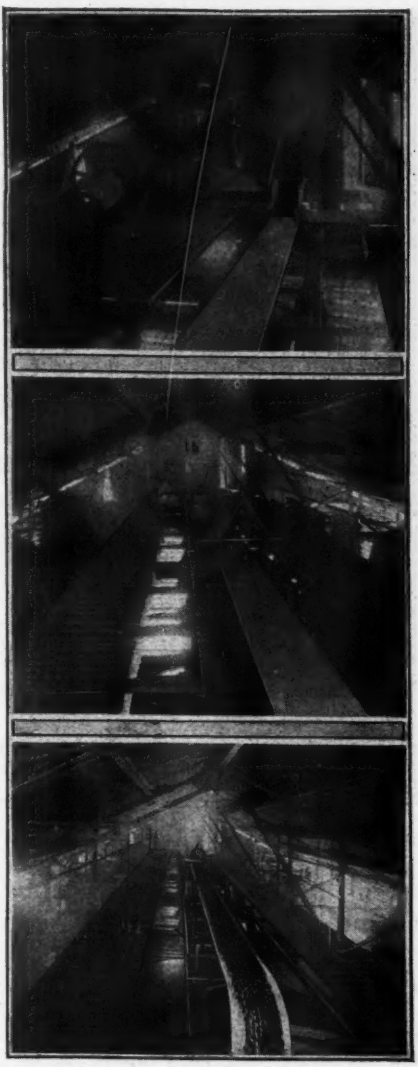
When handling non-abrasive materials the steel belt may be made to slide on wooden runners which soon acquire such a polish that the friction, and consequently the power consumption, are almost negligible. We refer to this as the "sliding type" conveyor.

The most common type of installation is the "rolling type" where both strands of the belt are carried on rollers in the usual way—the idlers on the top strand spaced 6 to 13 feet apart, depending on the material conveyed, with 35 feet spacing for the return strand idler.

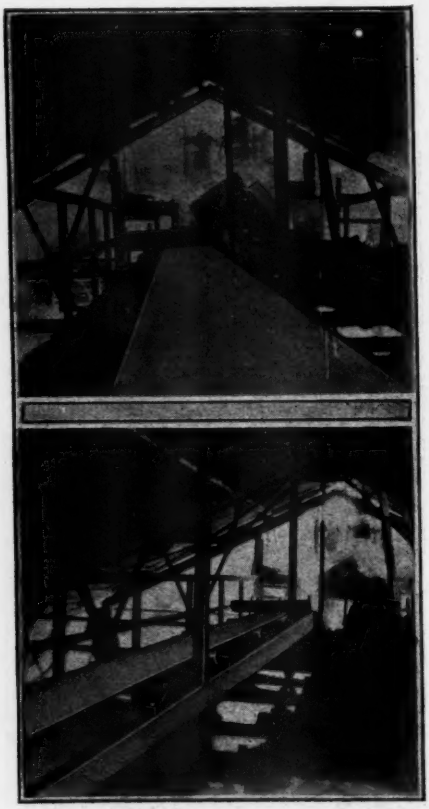
A combination of the rolling and sliding type can also be used.

The drive can be arranged at either head or tail end to suit local conditions, and if desired, both strands can be used at the same time for conveying in opposite directions, and under proper conditions the conveyor can be made reversible.

The belt can be installed on an incline, depending on the material handled—1 in 4 is the usual limit for a smooth belt that has to be scraped off for unloading, but if terminal un-



Installation of Sandvik Steel Conveyor Belt at Plant of Michigan Portland Cement Co. Chelsea, Mich., handling hot clinker.



Two Views of Installation at Penn-Allen Cement Co., Penn Allen, Pa., Handling Limestone

loading only is used, slats or small angles can be fastened to the belt at intervals and the incline increased to about 1 in 2.75.

The belt is very easy to install—in most cases of replacement the existing structure can be adapted to accommodate the steel belt, and it is even possible sometimes to use existing idlers and end pulleys, with slight alterations.

One essential feature of installation is the terminal pulley diameter which must have a certain ratio to the thickness of the belt—for a 16-inch belt a 40-inch diameter pulley must be used. In passing over this pulley the steel belt is subjected to a stress of from 28,000 to 30,000 pounds per square inch, and it has been found that with continuous bendings over a period of years, with a bending frequency which we endeavor as far as possible to keep about 1 per minute, the molecular structure of the steel is not affected. Standard practice is to make the face of the pulley three-quarters the width of belt, crowned in the usual way, but one-third in the center made flat.

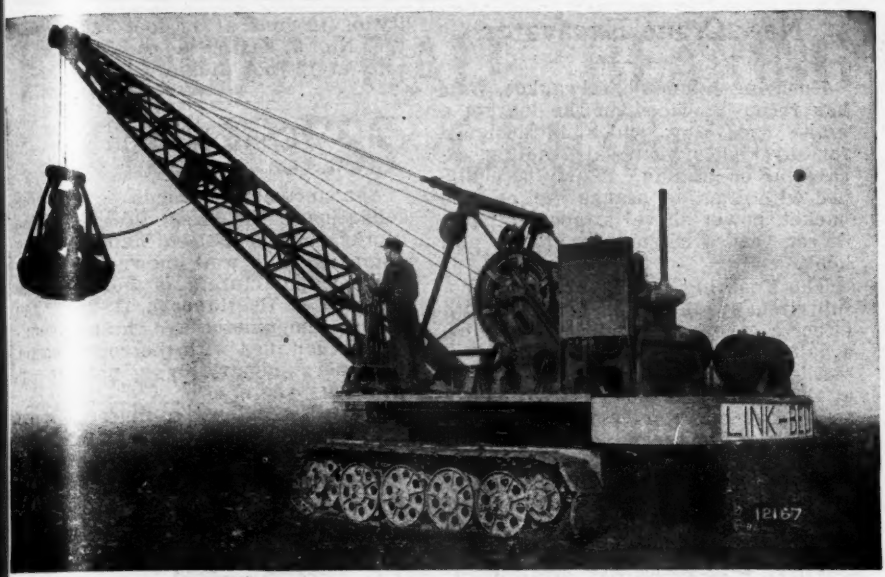
The speed depends on the length of conveyor—ordinarily between 135 and 300 feet per minute, and the capacity is thereby determined. For the average length conveyor, however, the average speed is about 200 ft. per minute. Installations as long as 800 feet on centers have been made.

"Primm Primer" a Good Looking Publication

A newsy little publication, that quite a number of Pit and Quarry readers must have already received is the "Primm Primer" published by the Power Manufacturing Company, Marion, Ohio. Volume 1, No. 1, of this publication came out under date of September, 1922, and made its bow to the engineering trade without pretentious promise, but with every indication of being well worth while. The chief feature of the first issue was an article on "The Development of Oil Engines" by R. O. Bresler, M. E., of the Power Manufacturing Company. Another article on the Power Company foundry, a page of news and another of humor, together with other pages illustrating the various Primm engines, made up the number.

The Osgood Company of Marion, Ohio, manufacturer of steam shovels, has established a district sales office in New York City, located at 60 Church St., with Mr. M. E. Pullen in charge. All business of the Osgood Company which was formerly handled by Mr. M. E. Davis, the former New York representative will now be handled through the district office.

The Standard Sand & Gravel Co., Wheeling, W. Va., which was organized August first of this year, is growing rapidly. Some of the equipment installed by this firm is the largest in the Ohio Valley, their dredge boat the "Sandow" being the largest one between Pittsburgh and Cincinnati. Walter Armstrong is president of the company, which maintains offices in the Board of Trade Building.



Link-Belt Crawler Crane with cab removed showing roomy platform for operator and accessibility of machinery

The New Link-Belt Crawler Crane

A Sturdy Reliable Machine for All-Around Service

The new Link-Belt Crawler Crane is built to the high standard of quality characteristic of all Link-Belt products.

It can operate with a hook-block, grab bucket, drag-line bucket, skimmer bucket, steam shovel attachment, electric lifting magnet, wood grapple, or pile driver attachment. It weighs 22 tons and can lift 10 tons at 12 ft. radius, or 3 tons at 30 ft. radius. The standard boom is 35 feet long.

The crane rotates four complete revolutions per minute, travels three-quarters of a mile per hour, and can easily climb a 20 per cent grade.

The crane is a one-man machine, because steering of the caterpillar truck is controlled in any position of the upper rotating base by a lever at the operator's stand in the cab. Complete specifications, price, and delivery upon request.

LINK-BELT COMPANY

Chicago—300 W. Pershing Road Philadelphia—Hunting Park Ave. & P. & R. Rwy.

LINK-BELT

New Crane Excavator

Koehring Company, Milwaukee, Wis., has recently placed on the market a crane excavator, which is designed for any kind of material handling, excavating or grading. It may be equipped with dragline, orange peel or grab bucket, power shovel attachment, pile driver leads, magnet, or block and hook.

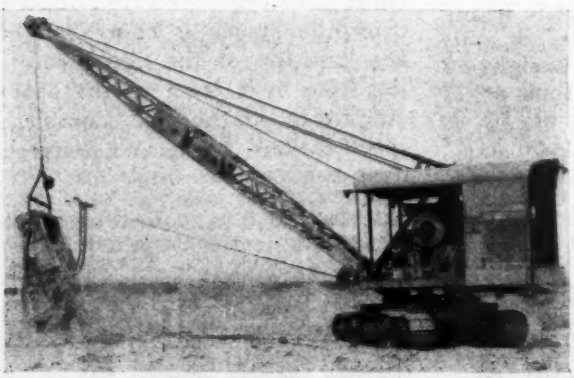
The Koehring crane excavator has a full circle swing and is furnished with either a canopy top and drop curtains, a half cab or with an enclosed cab.

All levers are conveniently banked at the right front side, in such a way as to give operator complete view of all parts of the work. All movements are independent of each other, and can be operated separately or in any combination desired.

Mounted upon full length multiplanes, it has forward and reverse traction, with a positive steering arrangement, and is able to travel anywhere.

When working at stock piles or in restricted quarters, no traveling of the crane is necessary. The clamshell bucket may be boomed in or out, as often as necessary, to reach materials without moving the crane. This distinctive and invaluable feature is accomplished through the use of a spur gear drive and large friction clutch giving operator absolute and instant control with maximum output. A double drum winding up the boom hoist cable equally on each side, equalizes the stresses in boom members.

The Koehring Crane is built in two sizes, the No. 2 crane, having a capacity of 12 tons at 12 foot radius and the No. 3 having a capacity of 20 tons at 12 foot radius.

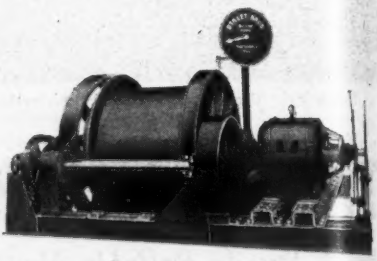


Koehring Crane Excavator

Consolidation

Announcement is made of the consolidation of the Street Bros. Machine Works and the Patten Manufacturing Company, both well known and prominent manufacturers of hoisting machinery, of Chattanooga, Tenn. The above companies have been prominently identified with the construction machinery industry for the past fifteen or twenty years.

"Street's" extensive line of large hoisting equipment, together with the complete line of small and medium



size Patten hoists, will form a most comprehensive and up-to-date line of modern hoisting equipment, consisting in its branches of the following:—All sizes of electric, gasoline, steam, and belt hoists, mine hoists, cargo hoists, capstans, winches, wood and steel derricks, etc.

J. H. Street will continue as president of the enlarged company, and J. W. Burress, sales manager of the Patten Manufacturing Company, will be sales manager of the "Street" Company.

The title of the new company will be Street Brothers Machine Works, Inc.

Robert Lutz, 1270 Knopp St., Madison, Wisconsin, has purchased rock crushing equipment for a $75,000 sand, gravel and crushed stone plant from Allis-Chalmers Mfg. Co., Milwaukee.

KENNEDY BALL BEARING GEARLESS CRUSHERS

WHY THEY LEAD

1—They are noiseless and run like watches.

2—50% greater capacity for same power.

3—Practically no wear on anything but head and concaves.

4—Short shaft and saving in head room with packed dust collars.

5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.

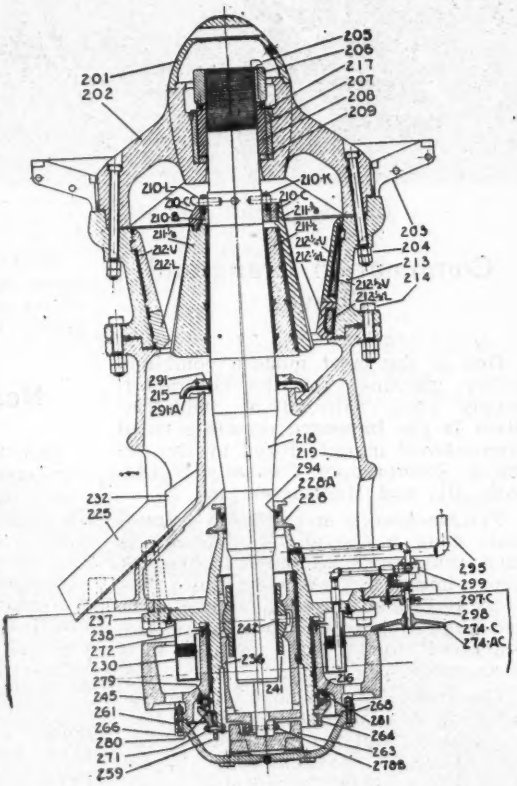
6—Can be driven right, left, or standard, as sent from shop.

7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.

8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.

9—Positive circulating oil system through filter and cut geared oil pump.

10—Made in our own shop by experts, trained for the job.



11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you were so inclined.

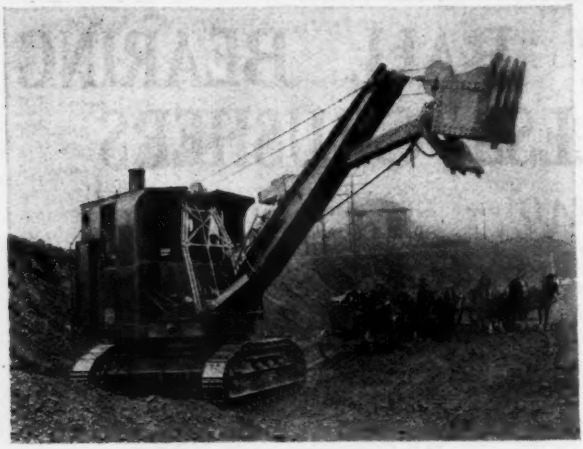
12—Our fine crusher does the work of 4 geared crushers.

Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.

KENNEDY VAN SAUN MFG. & ENGR. CORP.

120 Broadway **NEW YORK**

CIE. DES. ENTERPRISES INDUSTRIELLES, PARIS



Combined Crane and Shovel

Combination Crane and Shovel

One of the most modern combined utility machines for the contractor, supply yard, railroad or industrial plant is the improved crawling tread crane-shovel manufactured by the Orton & Steinbrenner Company of Chicago, Ill., and Huntington, Ind.

The machine is more than a crane—more than a shovel. The design is such that in a minimum amount of time simply by removing the crane boom and substituting the shovel boom and dipper, the crane may be readily converted from a clam shell rig to a steam shovel.

The radius of the boom instead of being fixed at a certain degree, may be varied to suit the conditions of the job. This feature enables it to dig several feet below the normal operating level and also increases the lift.

Motive power is supplied by only two engines, thus simplifying operations. The hoisting, swinging and traveling operations are performed with double clutches by the main non-reversing engines, while the crowding motion of the dipper is actuated by a separate reversing engine placed midway along the boom.

The rotating base turns on a live ring of rollers on a large diameter rail circle, thus evenly distributing the load and requiring very little power to swing.

The crawling tread is of the flexible type, adjusting itself automatically to the contour of the ground. The tread links are so designed that in passing around sprocket all foreign materials adhering to them are thrown off and prevented from entering the spaces between.

A feature of the machine is the accessibility of its parts, especially those bearing the brunt of the wear, consequently repairs when needed, can be installed in the field with a minimum amount of time lost.

Booklet describing this utility machine can be had by addressing the Orton & Steinbrenner Company, 608 South Dearborn Street, Chicago, Ill.

Next Year's Catalogue

The Anderson Foundry & Machine Company, Anderson, Indiana, has already published its 1923 Catalogue on the Anderson oil engine, which is known as General Catalogue No. 12.

A most interesting feature of this catalogue is the comparative power cost chart showing graphically all the details of power cost on seven different types of power equipment. It is a most interesting study to anyone who has to do with power installation.

The catalogue itself is fully illustrated with halftones of the various types of engines made by this company, typical installations, etc. It is entirely free on application to the company.

A new catalogue has just been issued by the Brown Hoisting Machinery Company, on Brownhoist drop forged chain for conveyors and elevators. This catalogue will gladly be mailed on request, and those desiring copies will receive same by writing to this company at Cleveland, Ohio.

Turner Gravel Co., San Antonio Texas, has been incorporated with capital of $50,000. Incorporators: J P. Turner, L. Retlage, James Aitken

After 51 Years of Service—

"Just Like a New One Right From the Shops"

Bolted to a rough plank in the plant of the McKee Coal Company, Frostburg, Maryland, you will find this old Cameron Direct-Acting Pump.

Shipped from the A. S. Cameron Works on November 11, 1870 this Pump has already rounded out 51 years of service and is still in good condition.

After all these years of service the McKee Coal Company says—

"We are pleased to advise that this Pump is working satisfactorily against a head of 150 feet and that there is nothing wrong or old in its actions whatever; works fine, **just like a new one right from the shops.**"

Write for Bulletin 7304

INGERSOLL-RAND COMPANY
11 Broadway, New York City
A. S. CAMERON STEAM PUMP WORKS
Offices Everywhere

118-S

Ingersoll-Rand

Loader Mounted on Truck

Loader Mounted on Truck

Several truck loader elevators to be mounted on motor trucks have been furnished recently by George Haiss Mfg. Co., Inc. The combination gives great mobility and flexibility to the fast and efficient path-digging loader element.

The regular path-digger elevator is used, with double chain, toothed buckets and feeding propellers, so that no shoveling is required for a path into the pile for the loader. It is pivoted on standard A-frames over the rear wheels, to be collapsed while traveling. A two-way side discharge chute is provided at the top for loading on either side.

The elevator is driven either from the jack shaft, if the truck is equipped with one for a dump body, or by a separate engine. The latter plan is more expensive but more efficient, as the truck chassis can be moved while loading.

The capacity is 1 to 2 cubic yards per minute.

New 4-Ton Locomotive

The Fate-Root-Health Company, Plymouth, Ohio, are placing on the market a new Plymouth gasoline locomotive known as Model CL, Type 2, weighing 4 tons, as illustrated. The points of superiority pointed out by the manufacturers are as follows:

Buda Engine, 4-inch bore, 5¼-inch stroke, rugged, powerful, heavy duty, with large crakshaft, large bearings, removable cylinder head, heated intake manifold and full force feed oiling.

Extra large radiator with Modine sectional core allowing removal of section if injured without interfering with operation. Cooled by powerful 4-blade fan.

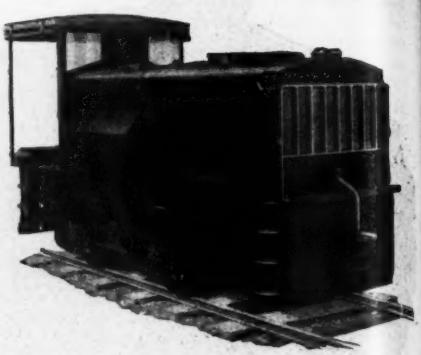
Improved telescopice coupling with sock absorbing provision between engine and transmission.

Drive or disc shaft carried in two bearings, relieving engine from all strains or stresses resulting from one bearing shaft.

Double width chain on main drive affords large margin of strength.

Positive and direct flow of sand through steep angle pipes, with valve for each wheel acting as agitator also.

Heavy, rigid, re-inforced frame, with low hanging bumpers, affording protection to sprockets and chains, also



against wheels sinking between ties in case of derailment.

Greatest accessibility and simplicity throughout.

This size and type locomotive is used largely in quarries and gravel pits. The manufacturers will be pleased to mail descriptive performance bulletins upon request.

Moore Sand & Gravel Co., Boston, Mass., has been incorporated with a capital of $36,000. Incorporators: William J. L. Roop of Melrose, Arthur H. Hall of Arlington and Arthur C. Moore of Watertown.